

Mainframe Installation
and Checkout

INSTALLATION

Guide



CYBER 960/962
Computer System

CYBER 960/962 Mainframe Complex

Installation and Checkout Guide

This product is intended for use only as described in this document. Control Data cannot be responsible for the proper functioning of undescribed features and parameters.

Manual History

New features, as well as changes, deletions, and additions to this manual, are indicated by vertical (change) bars in the margins.

Technical changes and additions are indicated by change bars and are correlated with the revision of the page on which they occur. Other changes, such as editorial and pagination, are not identified by change bars but may be included as part of a revision.

Revision	Change Order	Date	Reason for Change
A	-	10-04-88	Manual released.
B	ECO 50517	09-30-89	Manual revised; includes Engineering Change Order 50517, repositions floor cutouts on the CPU base layout. Also includes Engineering Change Orders 50305, 50393, 50456, 50512, 50585, 50628 and TARs 292785, 292818, 292931. Because extensive changes are made, change bars and dots are not used and all pages reflect the latest revision level. This edition obsoletes all previous editions.

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Equipment Supported in This Manual

This manual supports the following equipment at the series levels listed, assuming all field change orders (FCOs) against the equipment have been installed. Compare the list of FCOs in this table with the list in your equipment FCO log. If the two lists match, this manual accurately reflects your equipment.

Equipment	Series	FCOs	Comments
AD121-A	01	-	Released
	02	50499	
	03	50472	
AT478-B	01	-	Released
	02	50176	
	03	50558	
AT478-C	01	-	Released
	02	50558	
AT481-B	01	-	Released
	02	50176	
AT511-A	01	-	Released
	02	50176	
	03	50210	
	04	50193	ECO
	05	50511	
	06	50510	
	07	50415	
AT512-A	01	-	Released
	02	50176	
	03	50193	
CC598-A	01	-	Released
CC598-B	01	-	Released
GD311-A	01	-	Released
GK434-A	01	-	Released

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About This Manual

This manual provides information for the installation and checkout of the CONTROL DATA® CYBER® 960 and 962 Mainframe Complexes.

Audience

The manual addresses customer engineers who are trained on the CYBER 960 and 962 mainframe complexes.

Organization

The manual contains three chapters that include an introduction, installation, and checkout of the CYBER 960 and 962 mainframe complexes. The chapters contain step-by-step instructions, arranged in modules for a sequential order of installation and checkout.

Instructions in the manual begin with the time that follows equipment delivery, after its unpacking, removal from pallets (if present), and placement on the computer room floor. Unpacking instructions are on the exterior of the equipment shipping containers.

Conventions

New features, as well as changes, deletions, and additions to this manual, are indicated by vertical (change) bars in the page margins.

Technical changes and additions are indicated by change bars and are correlated with the revision of the page on which they occur. Other changes, such as editorial and pagination, are not identified by change bars but may be included as part of a revision.

Radio Frequency Warning

⚠ WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a class A computing device and peripheral computing devices pursuant to Subpart J of part 15 of the FCC Rules which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

Disclaimer

The installation and checkout information is valid only as described in this manual and other referenced manuals and documents. Control Data cannot be responsible for problems that result from improper installation and checkout. If any information in this manual conflicts with local building, electrical, or fire codes or ordinances, the customer should consult with local authorities on these matters.

IT IS THE CUSTOMER'S RESPONSIBILITY TO ENSURE THAT APPLICABLE BUILDING, ELECTRICAL, AND FIRE CODES OR ORDINANCES ARE FOLLOWED.

Related Manuals

This manual and other related manuals are listed in the CYBER 960/962 Hardware Manuals set figure on the following page.

Additional Related Manuals

Additional manuals, referenced in this manual but not in the CYBER 960/962 Hardware Manuals figure set, include:

Title	Publication Number
Remote Technical Assistance (RTA) Handbook	60000078
CYBER 96X MSL Test Procedures Reference Manual	60000292
MSL 15X Off-Line Maintenance Software Library Reference Manual	60456530
CYBER Initialization Package (CIP) Reference Manual	60457180
MSL 153/155 Maintenance Software Reference Manual Test Procedures	60461110
MSL 153/155 Maintenance Software Reference Manual Test Descriptions	60461920

CYBER 960/962 HARDWARE MANUALS

SYSTEM MANUALS

Site Preparation

General Information Site Preparation 60275100	Mainframe Complex Data Site Preparation 60000119	Peripheral Equipment Data Site Preparation 60275300
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Installation

Mainframe Complex Installation and Checkout 60000120

Operation

Cyber 170 State Hardware Reference 60000127	Virtual State Hardware Reference Volume I 60000132	Virtual State Hardware Reference Volume II 60000133
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System Console Operations/Maintenance Guides 60463610
--

Troubleshooting

System Troubleshooting Guide 60000122
--

Codes

System Codes Booklet 60458100	Maintenance Register Codes Booklet 60458110
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EQUIPMENT MANUALS

Central Processing Unit (CPU)

CPU Hardware Maintenance 60000123	CPU Theory and Diagrams 60000118
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Mainframe Power and Environmental

Mainframe Power and Environmental Subsystems Hardware Maintenance 60000125	Mainframe Power and Environmental Subsystems Theory and Diagrams 60000121
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Input/Output Unit (IOU)

IOU Hardware Maintenance 60000130	Cyber 960 IOU Manuals		
	IOU Theory and Diagrams 60463540	IOU Theory and Diagrams 60462210	Cables/Wires Microfiche 60000134
	Cyber 962 IOU Manuals		
	IOU Theory and Diagrams 60000235	IOU Theory and Diagrams 60000236	Cables/Wires Microfiche 60000135

Motor Generator and Control Cabinet (MG Sets)

25-kVA Frequency Converter Hardware Maintenance 60456520	40-kVA Control Cabinet and Motor Generator Hardware Maintenance 60454720	MG Interface Unit Hardware Maintenance 60000124
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Submitting Comments

Control Data welcomes your comments about this manual. Your comments may include your opinion of the usefulness of this manual, your suggestions for specific improvements, and the reporting of any errors you have found.

You can submit your comments on the comment sheet on the last page of this manual. If the manual has no comment sheet, mail your comments to:

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Introduction

1

Equipment in the Mainframe Complex 1-2

Tools, Parts, and Materials 1-4

Introduction

1

This chapter contains a list of equipment in the mainframe complex and a list of tools used in its installation.

Call your CYBER Hardware Support (CHS) at any time for assistance in resolving any installation or checkout difficulties.

Equipment in the Mainframe Complex

Table 1-1 lists the mainframe complex equipment. Figure 1-1 shows the equipment, except for the modem and frequency converter or MG set.

Table 1-1. CYBER 960 and 962 Mainframe Complex Units

Unit	Quantity
Mainframe	
• Power Unit	1
• Central Processing Unit (CPU) which includes: CP-0, optional CP-1, CM, and CMC	1
• Input/Output Unit (IOU)	1
Optional IOU Expansion	1
Optional Standalone IOU	1
Optional Standalone IOU Expansion	1
System Console	1
RTA Modem	1
MG Interface Unit	1
One of the following:	1
• 25-kVA, 50/60-Hz Frequency Converter or	
• 40-kVA, 50/60-Hz Motor-Generator (MG) Set	

NOTE

When the equipment includes options other than the physical units listed, the options are physically contained within the units when shipped to the site.

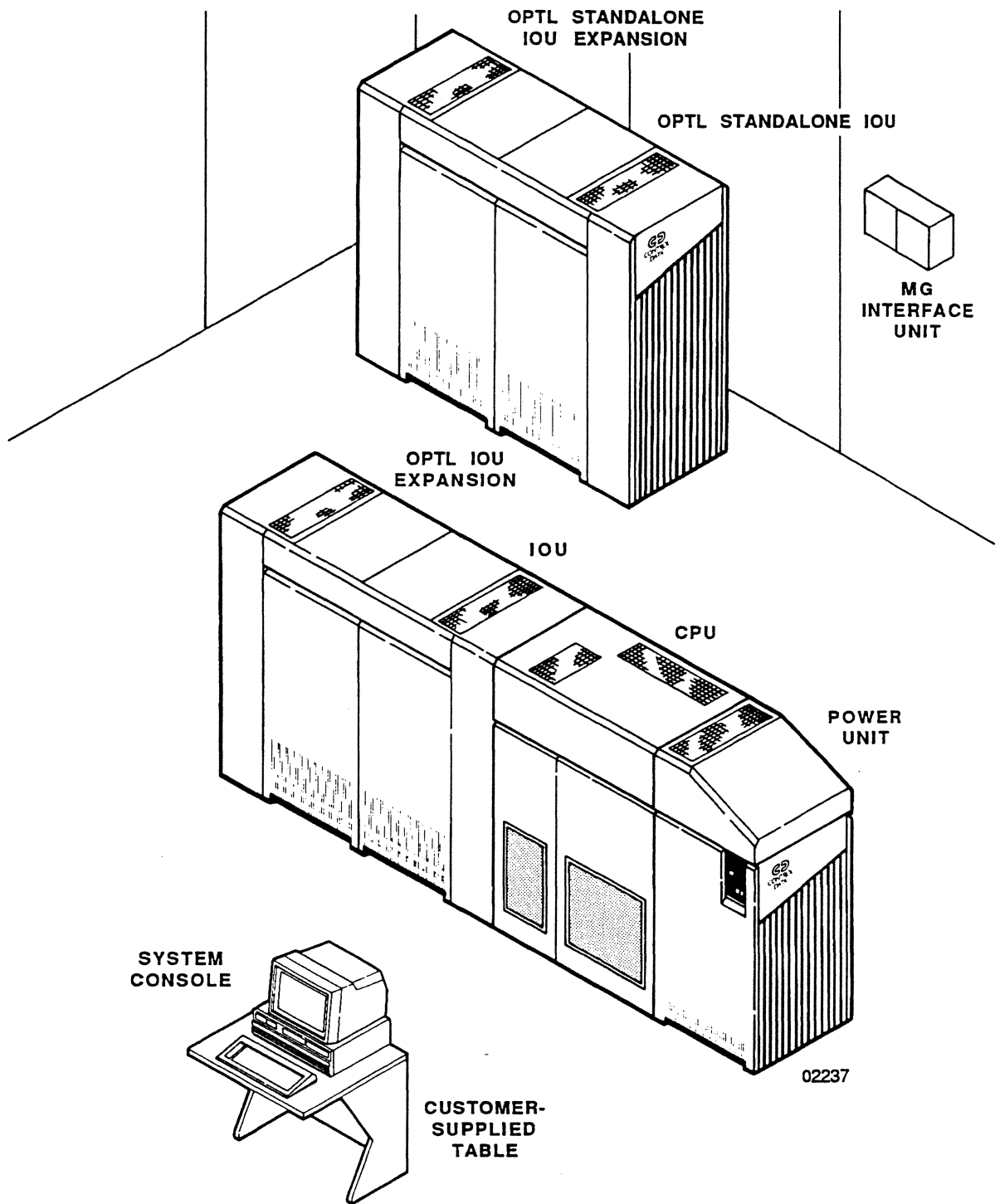


Figure 1-1. Mainframe Complex

Tools, Parts, and Materials

The following tools, parts, and materials are required for installation. The availability of these items is the responsibility of the equipment installers.

- Cable ties
- Cutter, diagonal
- Drive socket set, 1/4-in with 2-in extension
- Insertion tool, IOU pak
- Pak insertion tool for IOU modules
- Screwdriver, Phillips, medium
- Screwdriver, slotted, medium
- Smocks, antistatic, two minimum
- Tissues, absorbent
- Torx driver set
- Voltmeter, Fluke 77 Analog/Digital or equivalent
- Wand, insulated tuning
- Wrench, 10-in adjustable
- Wrench, ratchet and 1/2-in socket

The following tools, parts, and materials are required for installation. They are shipped in an installation kit with the power unit. The kit includes:

- Bolting hardware
- Cable, system console-to-power unit
- Cloth, cleaning
- Copper finger replacement sections
- Gauge, pin alignment
- Gloves, heavy duty
- Gloves, protective stretch
- Grease, electrical
- Pad, cleaning
- Quick Release
- Screwdriver, slotted, 100 mm (4 in) maximum length shaft
- Spacer plate, 1/4-in (four per IOU)
- Straightener, pin
- Wrench, Allen, 5/16-in (two)
- Wrench, torque and 1/2-in deep socket
- Wrist straps, antistatic, and ground wires

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The following major tasks outline the installation process for the CYBER 960 and 962 mainframes. These tasks require a minimum of two installers and consist of individual procedures, listed in sequential order.

In some installations the order of these procedures may change. In these instances, the installers must have a thorough familiarization with the procedures and the effect of the changes on the overall installation.

It is the installers' responsibility to select and perform only those steps applicable to the particular installation.

The installation process includes:

- Removing Shipping Materials
- Placing and Bolting Units
- Connecting Cables
- Checking Prepower Conditions
- Connecting Site Power Wiring
- Applying Initial Power
- Checking IOU Scanning Functions
- Checking EMI Seals

Should any problems arise during the installation that cause excessive delays and are not readily resolvable through normal installation practices or through the use of maintenance manuals listed in the front of this manual, call your CYBER Hardware Support (CHS).

CAUTION
--

The equipment installed in the following procedures may be damaged by electrostatic discharges. Installers must:

- Wear antistatic smocks during the entire installation.
 - Always wear an antistatic wrist strap connected to frame ground when working on the mainframe with the doors opened.
 - Install unit doors or panels as follows:
 1. Wear antistatic smock and wrist strap.
 2. Move door or panel near to installation location.
 3. Hold door or panel with one hand and connect ground wire from wrist strap to equipment frame ground with other hand.
 4. Install door or panel on equipment.
-

Removing Shipping Materials

The following procedures describe the removal of shipping materials from the power unit and CPU blowers.

- Remove Shipping Material from Power Unit Blower
- Remove Shipping Material from CPU Blowers

⚠ CAUTION

If equipment is cold upon delivery, allow equipment temperature to stabilize to minimize condensation before removing packaging material. A maximum stabilization time of eight hours is recommended.

Remove Shipping Material from Power Unit Blower

Use this procedure to remove shipping material from under the power unit blower.

- ___ 1. Check that unpackaging of equipment is complete.

NOTE

Go to step 7 if power unit muffler (figure 2-1) was shipped disassembled from the power unit.

- ___ 2. Turn muffler cam latch at rear of power unit fully counter-clockwise (ccw), using supplied 5/16-in Allen wrench.
- ___ 3. Turn power unit front door cam latch fully ccw with Allen wrench and open door.
- ___ 4. Unscrew captive screws on system status and main control panels. Open panels.
- ___ 5. Reach in panel openings and slide retaining clips back from muffler guide pins.

WARNING

- The weight of the power unit muffler requires a minimum of two installers to safely lift it off the unit.
 - Avoid touching sharp edges on the blower when removing shipping materials under the blower.
-

- ___ 6. Lift muffler up and off of power unit.
- ___ 7. Put on heavy duty gloves and protective arm sleeves (supplied in equipment installation kit) for removal of shipping material from blower.
- ___ 8. Stand on a support, if necessary, that allows you to safely reach in from top of power unit and remove shipping material from under blower.
- ___ 9. Set muffler on top of power unit. Guide pins must go into guide pin holes.
- ___ 10. Slide retaining clips into guide pins.
- ___ 11. Turn muffler cam latch at rear of power unit fully clockwise (cw).
- ___ 12. Check that muffler is securely fastened at front and back of unit.
- ___ 13. Close and secure system status and main control panels with captive screws. Be sure to keep cables clear of door hinges and closing areas to prevent cables from being pinched.
- ___ 14. Close and latch front power unit door.

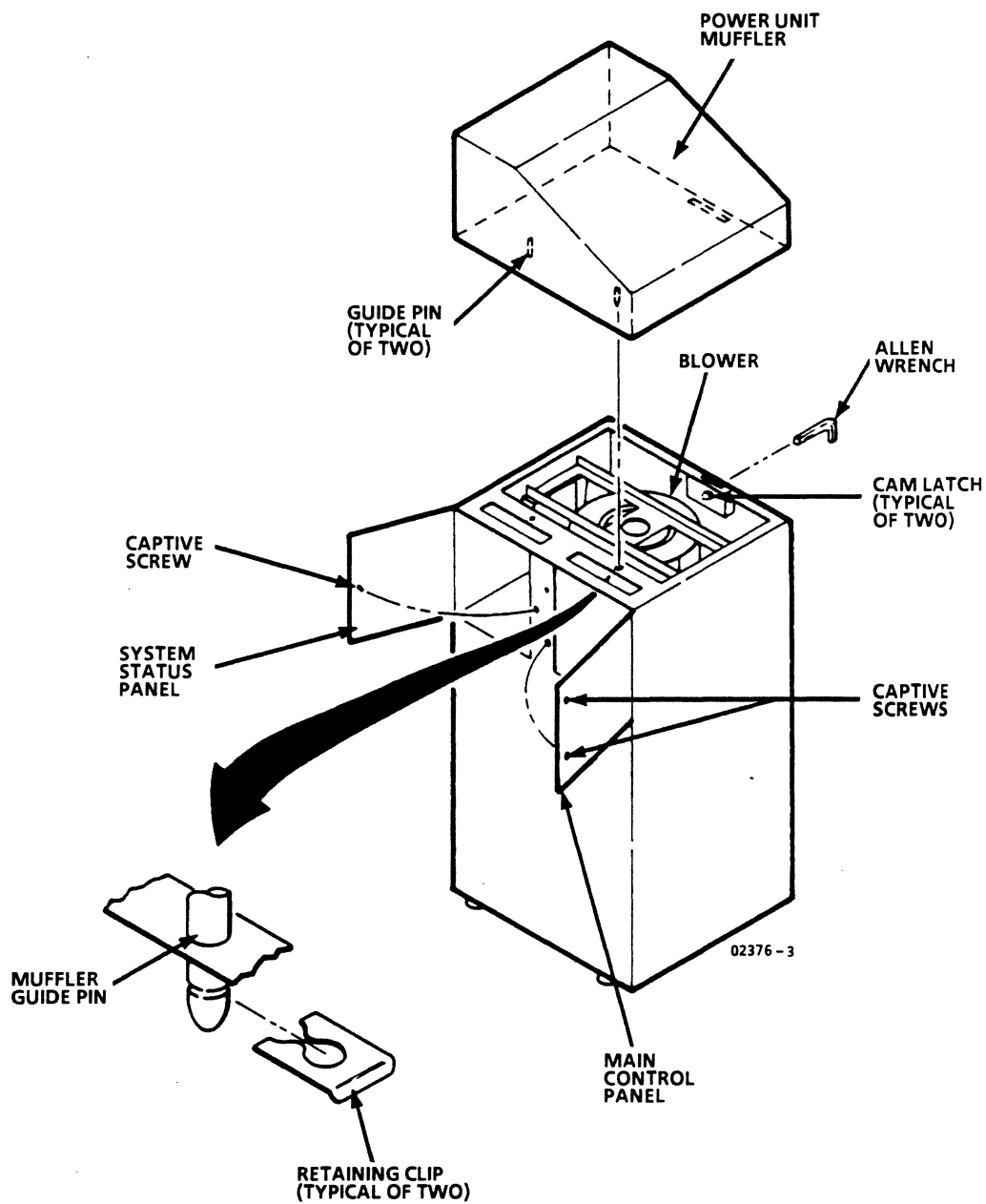


Figure 2-1. Power Unit Blower and Muffler

Remove Shipping Material from CP and CM Blowers

Use this procedure to remove shipping material under the CP and CM blowers.

- ___ 1. Check that unpackaging of equipment is complete.

NOTE

Go to step 5 if CPU muffler (figure 2-2) was shipped disassembled from the unit.

- ___ 2. Turn CPU front and rear door cam latches fully ccw with 5/16-in supplied Allen wrench and open doors.
- ___ 3. Turn two muffler cam latches at front and two at rear of CPU fully ccw, using 5/16-in Allen wrench.

WARNING

- The weight of the CPU muffler requires a minimum of two installers to safely lift it off the unit.
 - Avoid touching sharp edges on the blowers when removing shipping materials under the blowers.
-

- ___ 4. Lift muffler up and off of CPU.
- ___ 5. Put on heavy duty gloves and protective arm sleeves (supplied in system installation kit) for removal of shipping material from blower.
- ___ 6. Stand on a support, if necessary, that allows you to safely reach in from top of CP. Remove shipping material, if present, from under blower.
- ___ 7. Stand on a support, if necessary, that allows you to safely reach in from top of CM and remove shipping material from under blower.
- ___ 8. Set muffler on top of CPU with largest air vent positioned over CP blower. Guide pins must go into guide pin holes.
- ___ 9. Turn two muffler cam latches at front and two at rear of CPU fully cw.
- ___ 10. Check that muffler is securely fastened at front and back of unit.
- ___ 11. Close and latch CPU doors.

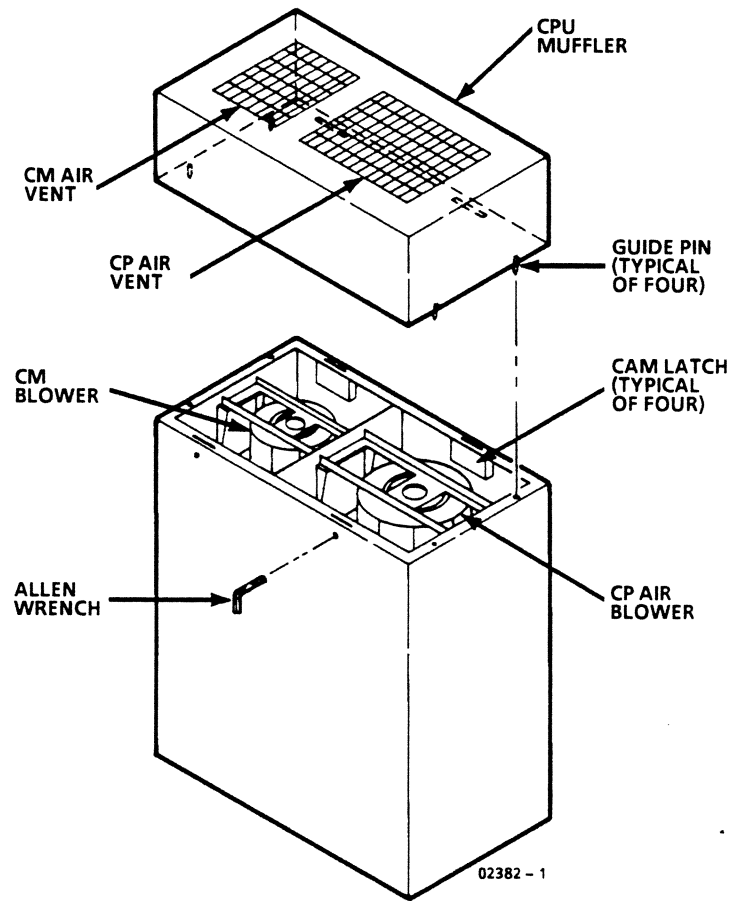


Figure 2-2. CPU Blowers and Muffler

To present the information in this chapter in a structured format, this page has been left blank.

Placing and Bolting Units

The following procedures describe the placing of the mainframe units at predetermined floor positions, greasing power-bus connections, bolting the units together, and installing trim panels.

- Check Floor Cutouts
- Preplace Power Unit
- Place CPU
- Prepare Power Bus Plates
- Place and Bolt Power Unit
- Connect Power Bus Plates
- Align Power Unit
- Place and Bolt IOU
- Place and Bolt Optional IOU Expansion
- Place Optional Standalone IOU
- Place and Bolt Optional Standalone IOU Expansion
- Install IOU Trim Panels

Check Floor Cutouts

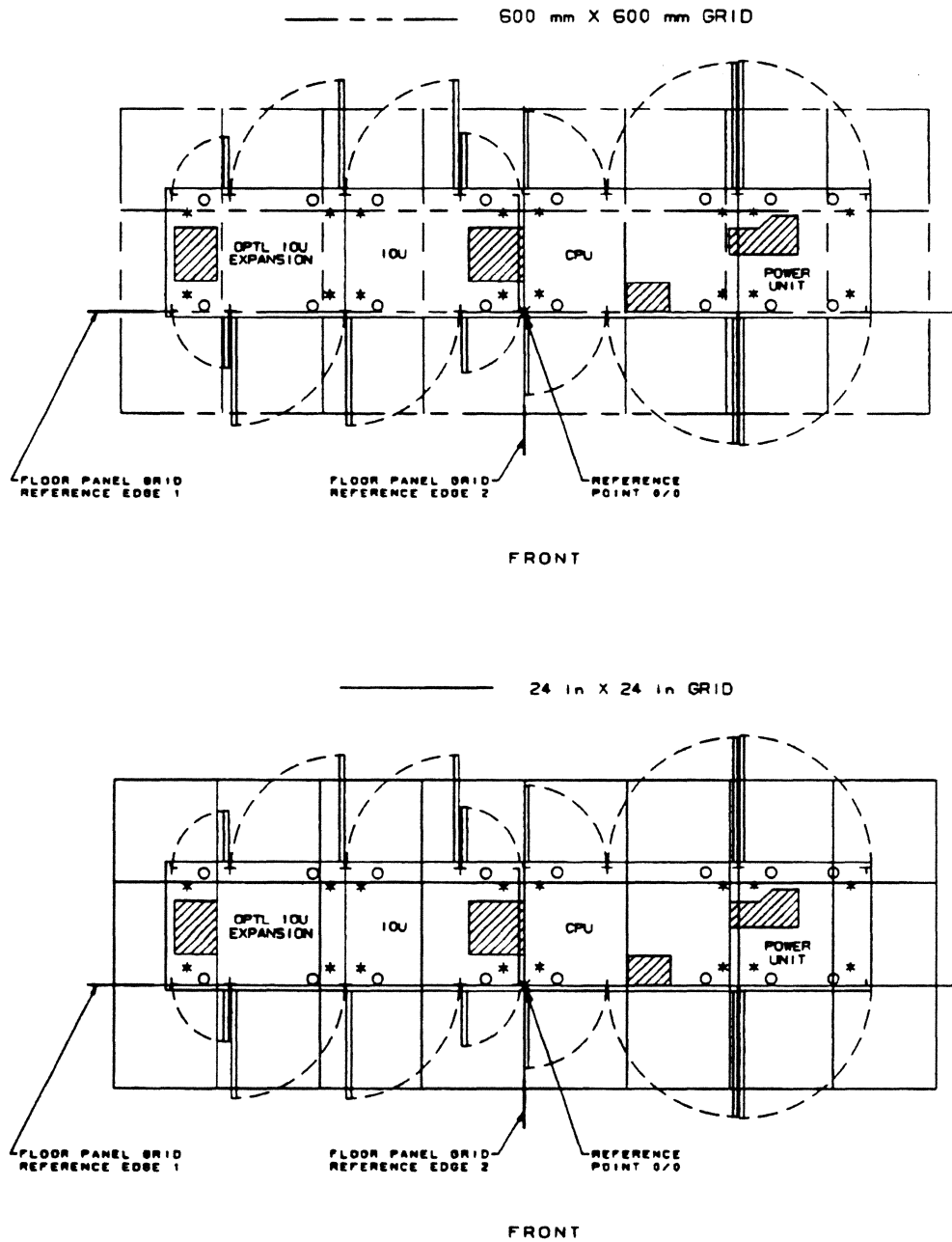
Use this procedure to check previously cut floor panels for the computer room, as defined in the Mainframe Complex Data Site Preparation manual. Use the procedure to also place the floor cutout panel for the power unit. Place the remaining floor cutout panels as they are needed during the installation.

- ___ 1. Compare floor cutout panels to figure 2-3 to ensure that all panels are present and to identify their locations with floor reference point 0/0.
- ___ 2. Place only power unit floor cutout panel in floor, if not previously placed.

** WARNING**

Unused floor cutout panels must be replaced with uncut panels until needed to avoid hazardous conditions to installers and equipment being moved.

- ___ 3. Remove other floor cutout panels, if in place, and temporarily replace them with uncut panels. Later procedures state when to place the remaining cutout panels.
- ___ 4. Be sure that uncut floor panels under the equipment are full-strength, without air holes.



NOTE:

FLOOR PLACEMENT OF THE OPTIONAL STANDALONE 10U AND STANDALONE 10U EXPANSION (NOT SHOWN) ARE THE SAME AS FOR THE 10U AND OPTIONAL 10U EXPANSION, AS REFERENCED FROM SIMILAR REFERENCE GRIDS 1 AND 2 THAT ESTABLISH A REFERENCE POINT 0/0 FOR THE STANDALONE UNITS.

60000120-02

Figure 2-3. Floor Cutout Panels

Preplace Power Unit

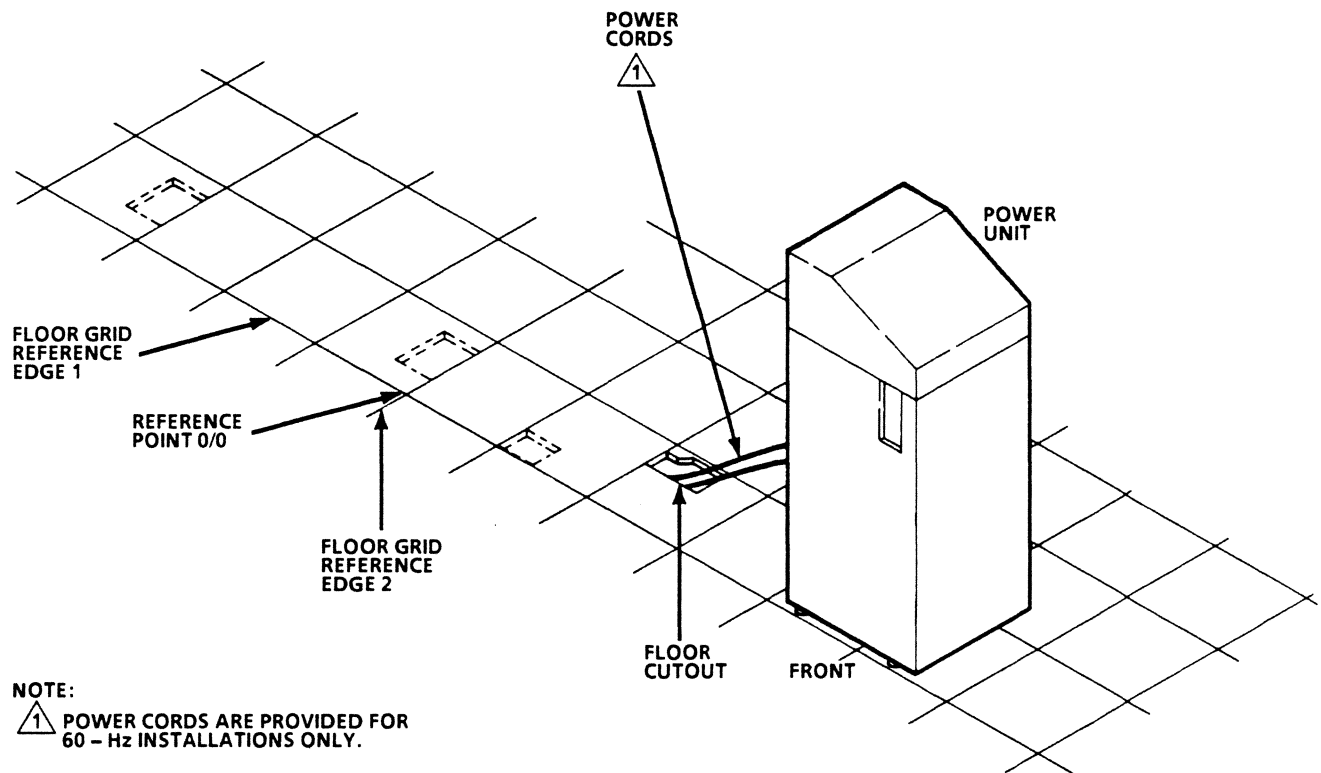
Use this procedure to initially position the power unit.

- ___ 1. Be sure that:
 - ___ a. Blower mufflers are installed on CPU and power unit.
 - ___ b. Floor cutout panel for power unit is in place.

⚠ WARNING

Be careful when moving power unit to prevent a caster from rolling into floor cutout and tipping, possibly overturning, the unit.

- ___ 2. Move power unit to approximate location as shown in figure 2-4.
- ___ 3. Place power cords into floor cutout. (Power cords are not used at sites that use direct-power-wiring connections. A later procedure describes the power-cord and direct-wiring connections.)



X02386-2

Figure 2-4. Power Unit Initial Placement

- ___ 4. Turn front and rear door cam latches fully ccw, using supplied 5/16-in Allen wrench, and open doors.
- ___ 5. Remove front and rear doors (figure 2-5) after unscrewing one end of strain relief and removing two push-to-release pins from hinges on each door. Store pins in door hinges.
- ___ 6. Release quarter-turn fasteners on front and rear airflow control panels and remove panels.
- ___ 7. Remove power-unit-to-system-console cable, stored in lower part of power unit. This is a 15.2-m (50-ft) cable, installed in a later procedure.

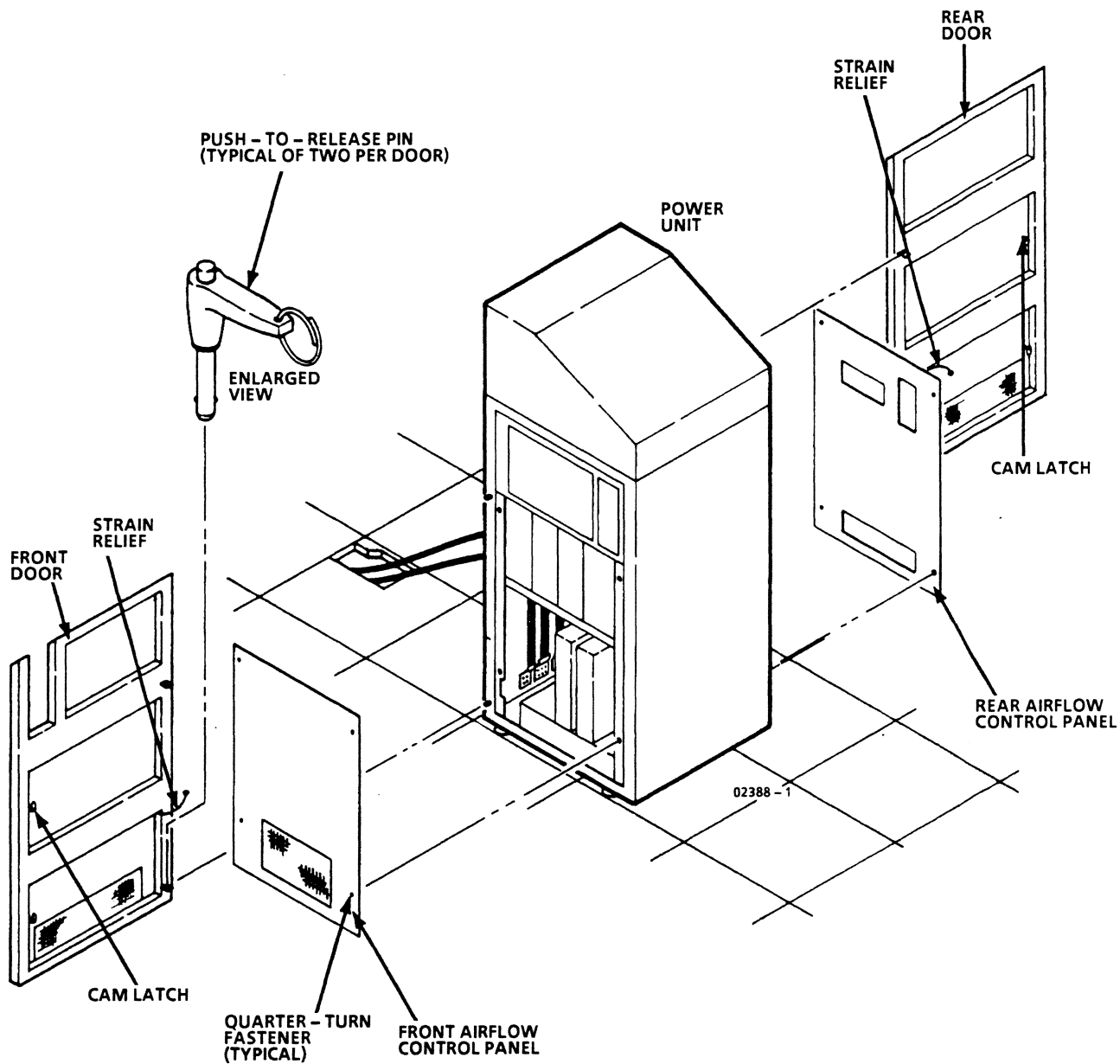


Figure 2-5. Power Unit Door and Panel Removal

Place CPU

Use this procedure to position the CPU and lower its leveling pads.

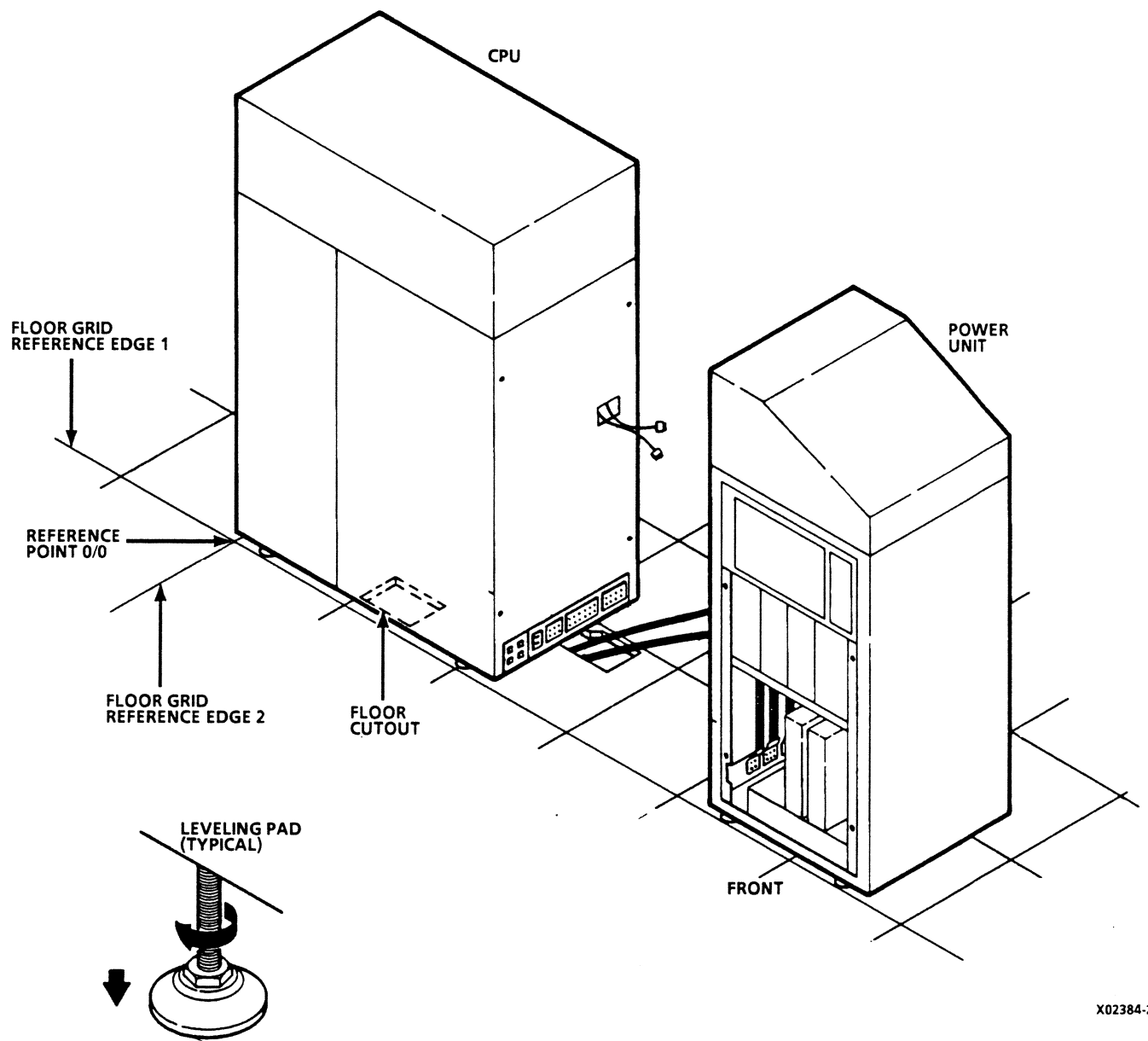
Procedure

- ___ 1. Be sure that:
 - ___ a. Previous procedure is completed.
 - ___ b. Site preparations have identified CPU floor reference point 0/0 (figure 2-6).
- ___ 2. Place CPU floor cutout panel in floor.

WARNING

Be careful when moving CPU to prevent a caster from rolling into floor cutout and tipping, possibly overturning, the unit.

- ___ 3. Move CPU to its location over floor cutout so that:
 - ___ a. Open CPU doors to observe frame, relative to floor grid.
 - ___ b. Left front corner of frame is at reference point 0/0, intersection of floor grid reference edges 1 and 2.
 - ___ c. Front of frame is in line with floor grid reference edge 1.
 - ___ d. Left end of frame is in line with floor grid reference edge 2.
- ___ 4. Lower leveling pads until they just touch floor. Leveling pads must not sit across floor tile edge at front of CPU.
- ___ 5. Lower leveling pads equally until they remove weight from casters. Caster must be able to turn freely.
- ___ 6. Visually inspect CPU to see that it is in general alignment with surrounding room vertical and horizontal surfaces. Adjust leveling pads as necessary.
- ___ 7. Check that leveling pad adjustments permit casters to turn freely.



X02384-2

Figure 2-6. CPU Placement

Prepare Power Bus Plates

Use this procedure to grease the power bus connections on the power unit and the CPU before moving and bolting the units together.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Remove shipping fixture (figure 2-7) from power unit power bus plates. Remove mounting bolts from rear of plates, inside unit. (Use a 1/2-in deep socket on a ratchet wrench.)
- ___ 3. Remove shipping fixture from CPU power bus plates. Remove mounting bolts from outside of unit.
- ___ 4. Remove shipping fixture for power cords, if present. Remove mounting bolts from inside unit.

CAUTION

Be careful when cleaning contact areas with Scotch Brite, as it is very abrasive. Don't rub hard, or you'll remove the plating.

- ___ 5. Lightly clean contact areas of CPU and power unit power bus plates with Scotch Brite.

WARNING

Do not come in direct contact with electrical grease. It may irritate the skin and is harmful if swallowed.

- ___ 6. Put on protective gloves (supplied with equipment).
- ___ 7. Use cleaning cloth (supplied in installation kit) to apply and spread a thin layer of electrical grease (supplied in installation kit) on power bus plates of both units.
- ___ 8. Wipe plates with a clean part of cloth to ensure a minimal layer of grease on plates.
- ___ 9. Set aside and label mounting bolts from shipping fixture to prevent them from being confused with bolts used in later procedures.
- ___ 10. Check that insulator for CPU power bus plates sits in and around plates. Insulator must not get pinched between plates during assembly.

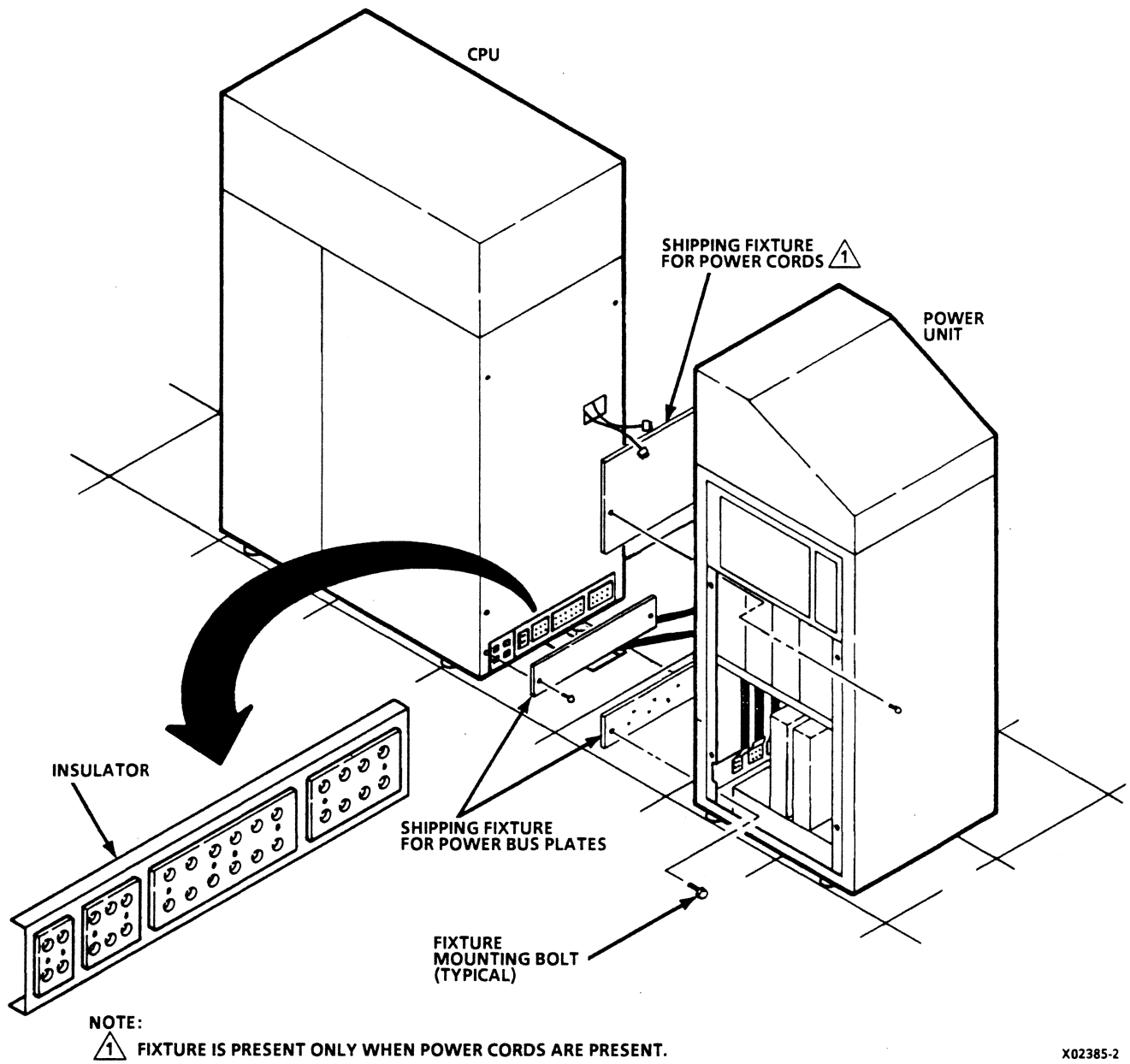


Figure 2-7. Power Bus Plate Preparations

Place and Bolt Power Unit

Use this procedure to move the power unit into position next to the CPU and to bolt it to the CPU.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Inspect copper fingers around interface openings on power unit. Replace any 25 mm (1 in) or greater section of adjacent fingers that are missing or deformed and will not compress between units. (Replacement copper fingers are supplied with equipment.)

⚠ WARNING

Be careful when moving power unit to prevent a caster from rolling into floor cutout and tipping, possibly overturning, the unit.

- ___ 3. Move power unit near to and in line with CPU while routing power cords, if present, into floor cutout (figure 2-8).
- ___ 4. Connect CPU blower cable connectors J1 and J2 to power unit cable connectors 1A2P1 and 1A2P2. Pull on connectors to ensure that they are locked together.
- ___ 5. Move power unit against CPU being careful not to pinch cables.
- ___ 6. Install two lower 5/16 x 1-1/4-in bolts (with washers) loosely through power unit into CPU fixed nuts.
- ___ 7. Unlatch and open front and rear CPU doors.
- ___ 8. Adjust two power unit leveling pads nearest to CPU so that front and rear alignment marks align with those on CPU. CPU front and rear doors next to alignment marks may be removed for better visibility of alignment marks.
- ___ 9. Adjust power unit leveling pads furthest from CPU until vertical surfaces between units appear parallel.
- ___ 10. Install two upper 5/16 x 2-in bolts (without washers) loosely through power unit into CPU fixed nuts.
- ___ 11. Tighten lower and upper bolts just enough to pull units together. Then loosen lower and upper bolts one turn to permit final leveling in a later procedure.

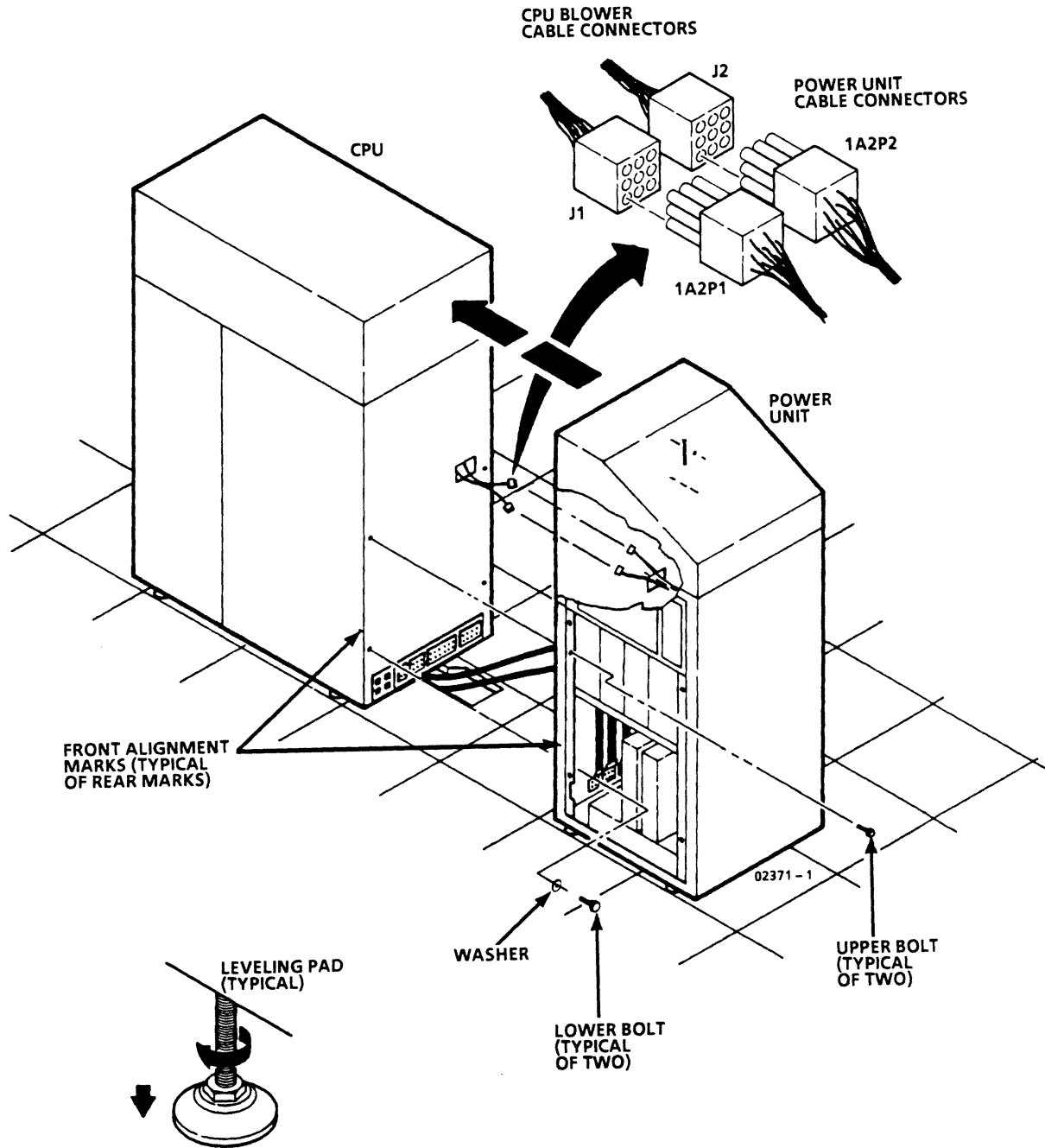


Figure 2-8. CPU Bolting

Connect Power Bus Plates

Use this procedure to bolt power unit power bus plates to CPU power bus plates.

- ___ 1. Be sure that previous procedure is completed.

⚠ CAUTION

Use extreme care to ensure that the insulator, set in and around the CPU power bus plates, does not protrude and get pinched between the CPU and power unit plates during bolting.

- ___ 2. Check that insulator does not overlap edges of CPU power bus plates (figure 2-9).
- ___ 3. Align middle power bus plate in power unit to its mating plate in CPU, fitting plate guide pins into mating guide pin holes.
If mating plates do not align:
 - ___ a. Adjust unit alignment with minor adjustments to leveling pads.
 - ___ b. Maintain alignment of alignment marks between units.

⚠ CAUTION

Install washers with smooth sides toward bus plates to prevent marring of the plates.

- ___ 4. Hand-thread 5/16 x 1-1/4-in bolts (with washers) into plates. This may require one installer to align and hold plates while second installer hand-threads bolts.
- ___ 5. Align and hand-thread bolts in remaining power bus plates.
- ___ 6. Set torque wrench (supplied with equipment) to 15.8 N·m (140 lbf·in).
- ___ 7. Tighten all bus plate bolts with torque wrench, using 1/2-in deep socket (supplied with equipment).
- ___ 8. Check that insulator is not pinched between power bus plates by pressing insulator between plates with finger or some small object. Insulator will flex, if it is not pinched.

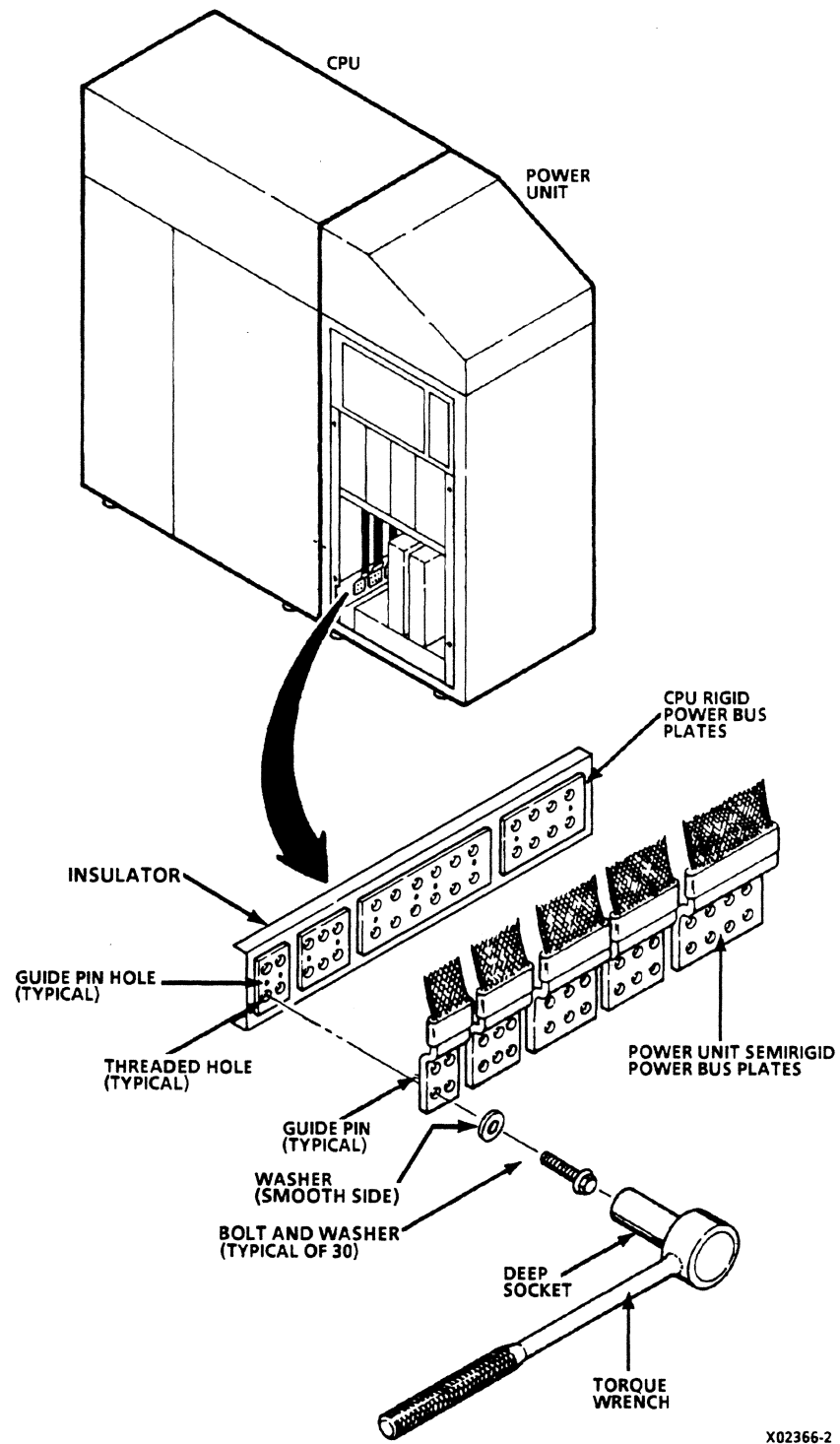


Figure 2-9. Power Bus Plate Connections

Align Power Unit

Use this procedure to make final alignment of the power unit with the CPU and to tighten the bolts between the units.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Close and latch CPU doors.
- ___ 3. Visually check for straight front and rear trim lines across units (figure 2-10).
- ___ 4. Visually check for parallel surfaces between units. Surfaces may be touching or slightly separated at this time.
- ___ 5. Adjust leveling pads to achieve correct visual alignment. Unit alignment marks do not have to align at this time, but any adjustments must be minor to prevent stressing bolts between units.
- ___ 6. Check that leveling pad adjustments permit casters to turn freely.
- ___ 7. Tighten bolts between units.

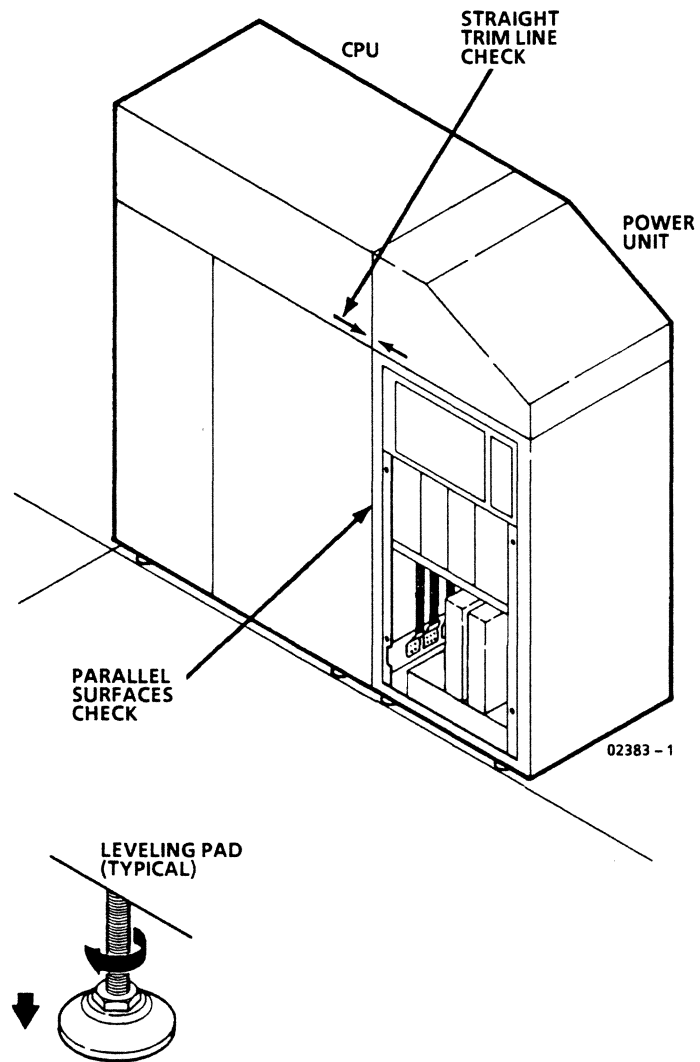


Figure 2-10. Power Unit Alignment

Place and Bolt IOU

Use this procedure to move and bolt the IOU to the CPU.

NOTE

Bolting hardware and spacer plates for the optional IOU expansion are supplied with the system installation kit. If the optional IOU expansion is not being installed at this time, save the extra hardware and spacer plates for possible later use.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Inspect copper fingers around interface opening on IOU (figure 2-11). Replace any 25 mm (1 in) or greater section of adjacent fingers that are missing or deformed and will not compress between units. (Replacement copper fingers are supplied with equipment.)
- ___ 3. Place IOU floor cutout panel in floor.

WARNING

Be careful when moving IOU to prevent a caster from rolling into a floor cutout and tipping, possibly overturning, the unit.

- ___ 4. Move IOU up to and in line with CPU.
- ___ 5. Unlatch and open IOU doors.
- ___ 6. Place a spacer plate (in installation kit) under each leveling pad.
- ___ 7. Adjust IOU leveling pads, nearest CPU, so that bolt holes in units align. To prevent screwing pads out of IOU, do not permit any pad to raise casters more than 1/4-in off floor.
- ___ 8. Install two 5/16 x 2-1/2-in bolts (with washers and lock washers) loosely through IOU into CPU fixed nuts.
- ___ 9. Adjust two IOU leveling pads furthest from CPU so that surfaces between units appear parallel.
- ___ 10. Close and latch IOU doors.
- ___ 11. Visually check for straight front and rear trim lines across units.
- ___ 12. Visually check for parallel surfaces between units.
- ___ 13. Adjust IOU leveling pads to achieve correct visual alignment. Adjustments must be minor to prevent stressing bolts between units.
- ___ 14. Check that leveling pad adjustments permit casters to turn freely.
- ___ 15. Open IOU doors and tighten bolts between units.

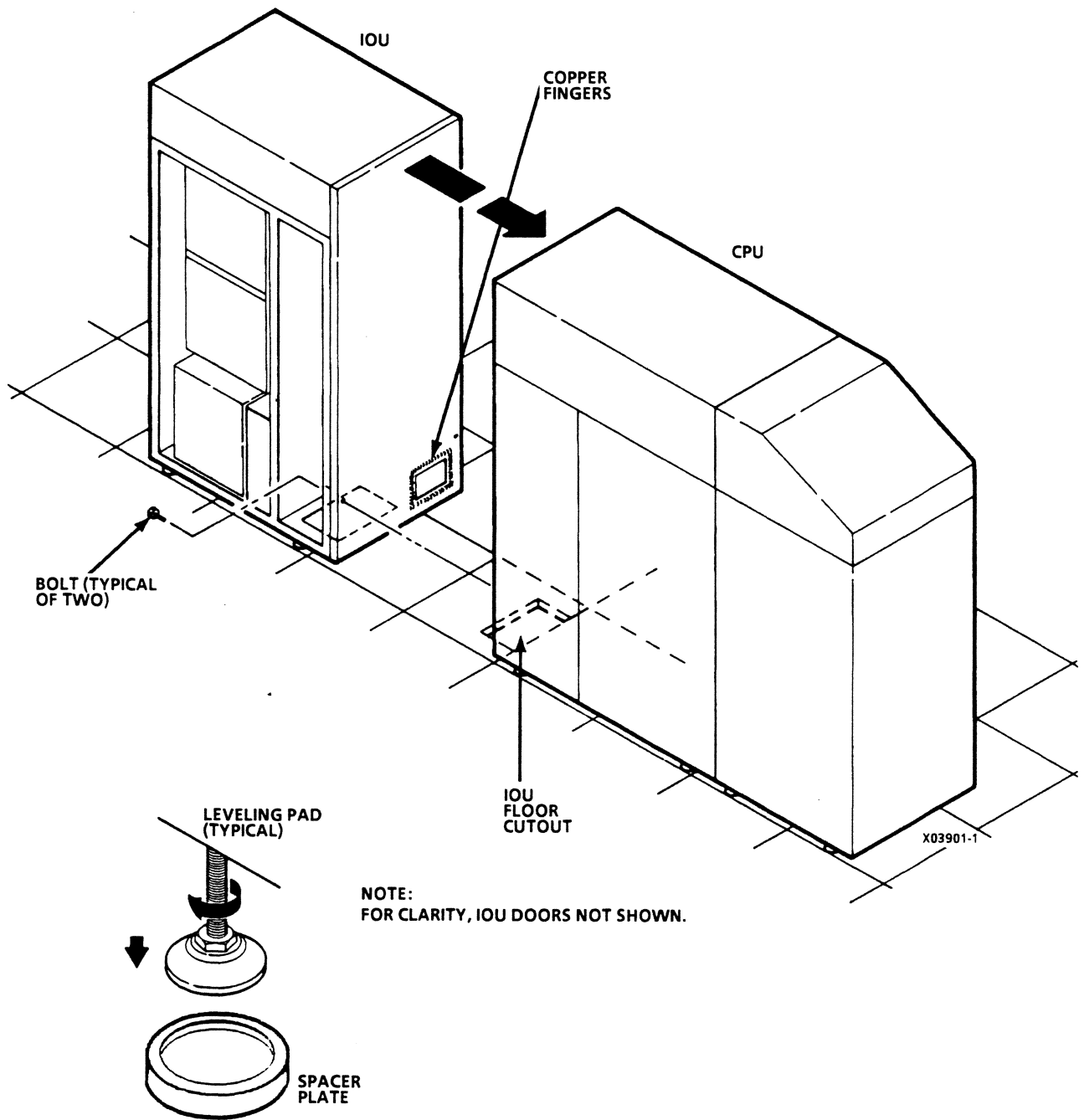


Figure 2-11. IOU Bolting

Place and Bolt Optional IOU Expansion

Use this procedure to move and bolt the optional IOU expansion to the IOU. If optional IOU expansion is not present, proceed to Connecting Cables.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Inspect copper fingers around interface opening on optional IOU expansion (figure 2-12). Replace any 25 mm (1 in) or greater section of adjacent fingers that are missing or deformed and will not compress between units. (Replacement copper fingers are supplied with equipment.)
- ___ 3. Place IOU expansion floor cutout panel in floor.

WARNING

Be careful when moving IOU expansion to prevent a caster from rolling into a floor cutout and tipping, possibly overturning, the unit.

- ___ 4. Move IOU expansion up to and in line with IOU.
- ___ 5. Unlatch and open IOU expansion doors.
- ___ 6. Place a spacer plate (in installation kit) under each leveling pad.
- ___ 7. Adjust IOU expansion leveling pads, nearest IOU, so that bolt holes in units align. To prevent screwing pads out of IOU, do not permit any pad to raise casters more than 1/4-in off floor.
- ___ 8. Install two 5/16 x 1-1/4-in bolts, washers, and nuts loosely through lower front and rear holes between units. If IOU expansion has threaded bolt holes, use washers only at bolt heads.
- ___ 9. Adjust two IOU expansion leveling pads furthest from IOU so that surfaces between units appear parallel.
- ___ 10. Install remaining six bolts, washers, and nuts (if used) loosely between units.
- ___ 11. Close and latch IOU and IOU expansion doors.
- ___ 12. Visually check for straight front and rear trim lines across units.
- ___ 13. Visually check for parallel surfaces between units.
- ___ 14. Adjust IOU expansion leveling pads to achieve correct visual alignment. Adjustments must be minor to prevent stressing bolts between units.
- ___ 15. Check that leveling pad adjustments permit casters to turn freely.
- ___ 16. Open IOU doors and tighten two bottom, two top, and then remaining bolts.

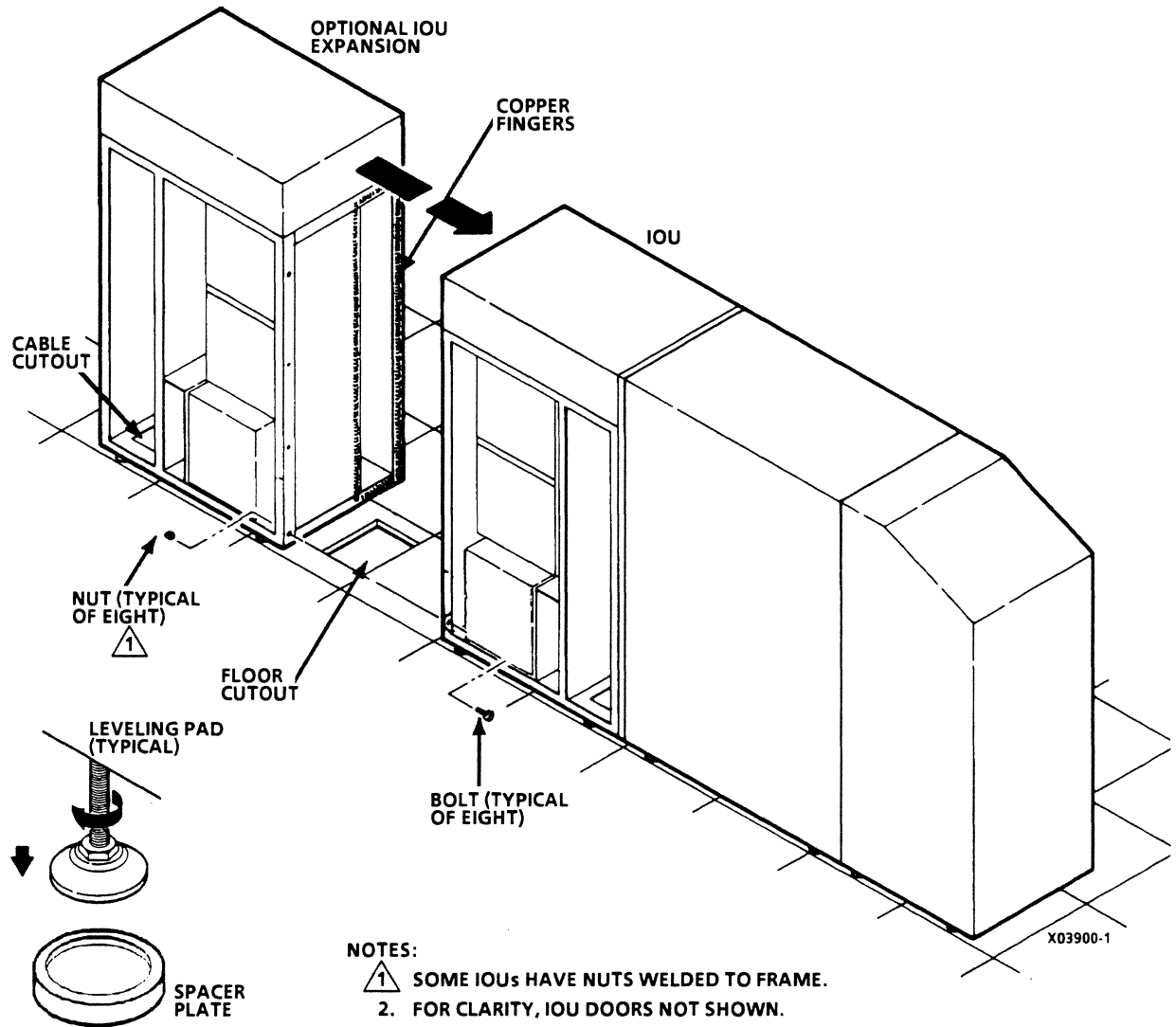


Figure 2-12. Optional IOU Expansion Bolting

Place Optional Standalone IOU

Use this procedure to place the optional standalone IOU. If optional standalone IOU is not present, proceed to Install IOU Trim Panels.

- ___ 1. Be sure that site preparations have identified optional standalone IOU floor reference point 0/0 (figure 2-13).
- ___ 2. Place standalone IOU floor cutout panel in floor.

⚠ WARNING

Be careful when moving standalone IOU to prevent a caster from rolling into a floor cutout and tipping, possibly overturning, the unit.

- ___ 3. Move standalone IOU over floor cutout so that:
 - ___ a. Right front corner of frame is at reference point 0/0, intersection of floor grid reference edges 1 and 2.
 - ___ b. Front of frame is in line with floor grid reference edge 1.
 - ___ c. Right end of IOU frame is in line with floor grid reference edge 2.
- ___ 4. Place a spacer plate (in installation kit) under each leveling pad.
- ___ 5. Lower leveling pads until they just touch floor. Leveling pads must not sit across floor tile edge at front of standalone IOU.
- ___ 6. Lower leveling pads equally until they remove weight from casters. Casters must be able to turn freely. To prevent screwing pads out of IOU, do not permit any pad to raise casters more than 1/4-in off floor.
- ___ 7. Visually inspect standalone IOU to see that it is in general alignment with surrounding room vertical and horizontal surfaces. Adjust leveling pads as necessary.
- ___ 8. Check that leveling pad adjustments permit casters to turn freely.

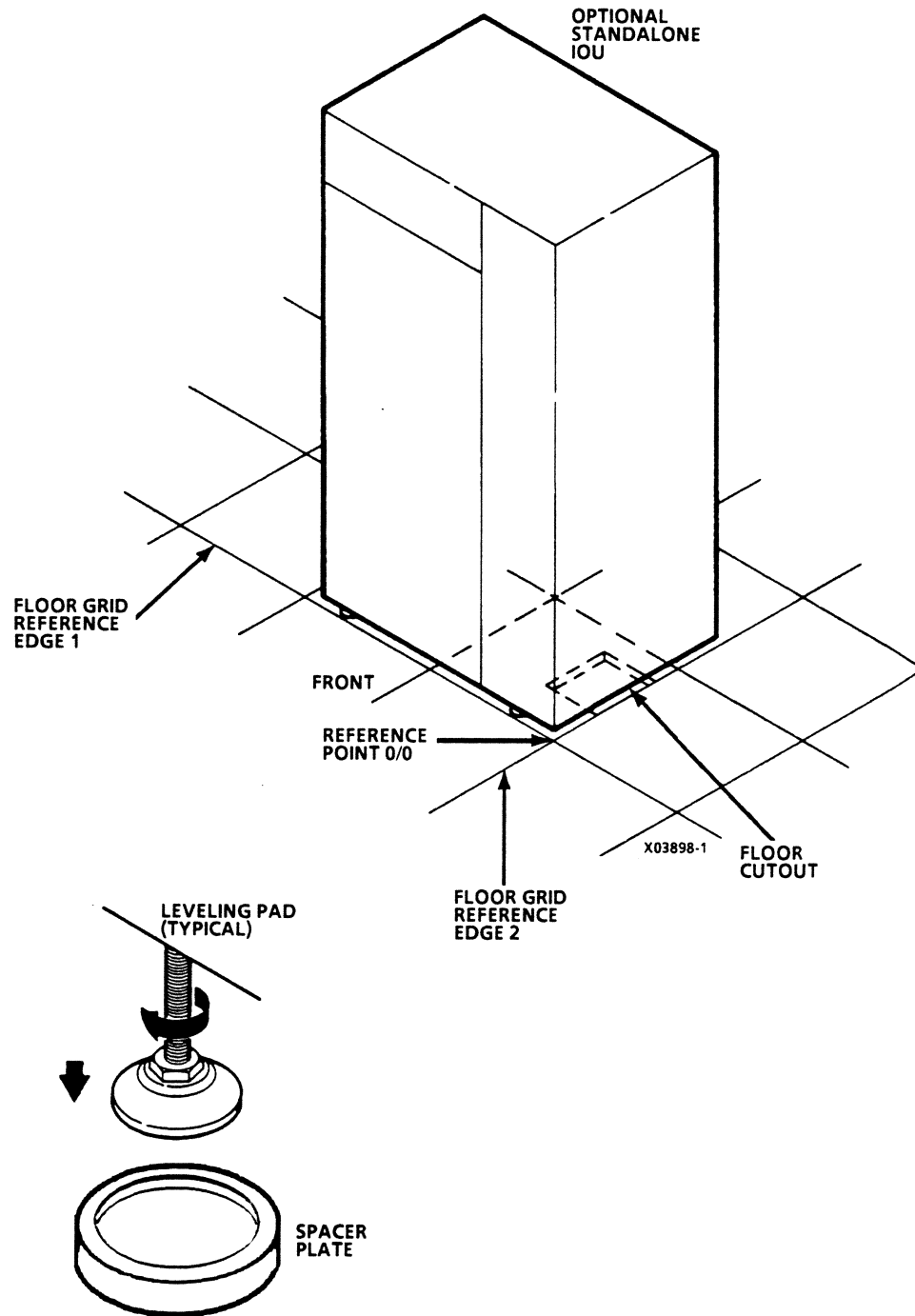


Figure 2-13. Optional Standalone IOU Placement

Place and Bolt Optional Standalone IOU Expansion

Use this procedure to place and bolt the optional standalone IOU expansion to the optional standalone IOU. If optional standalone IOU expansion is not present, proceed to Connecting Cables.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Inspect copper fingers around interface openings on standalone IOU expansion (figure 2-14). Replace any 25 mm (1 in) or greater section of adjacent fingers that are missing or deformed and will not compress between units. (Replacement copper fingers are supplied with equipment.)
- ___ 3. Place standalone IOU expansion floor cutout panel in floor.

▲WARNING

Be careful when moving standalone IOU expansion to prevent a caster from rolling into a floor cutout and tipping, possibly overturning, the unit.

- ___ 4. Move standalone IOU expansion up to and in line with standalone IOU.
- ___ 5. Unlatch and open doors of both standalone IOUs.
- ___ 6. Place a spacer plate (in installation kit) under each leveling pad.
- ___ 7. Adjust standalone IOU expansion leveling pads, nearest standalone IOU, so that bolt holes in units align. To prevent screwing pads out of IOU, do not permit any pad to raise casters more than 1/4-in off floor.
- ___ 8. Install two 5/16 x 1-1/4-in bolts, washers, and nuts loosely through lower front and rear holes between units. If standalone IOU expansion has threaded bolt holes, use washers only at bolt heads.
- ___ 9. Adjust two standalone IOU expansion leveling pads furthest from standalone IOU so that surfaces between units appear parallel.
- ___ 10. Install remaining six bolts, washers, and nuts (if used) loosely between units.
- ___ 11. Close and latch doors of both standalone IOUs.
- ___ 12. Visually check for straight front and rear trim lines across units.
- ___ 13. Visually check for parallel surfaces between units.
- ___ 14. Adjust standalone IOU expansion leveling pads to achieve correct visual alignment. Adjustments must be minor to prevent stressing bolts between units.
- ___ 15. Check that leveling pad adjustments permit casters to turn freely.
- ___ 16. Open IOU doors and tighten two bottom, two top, and then remaining bolts.

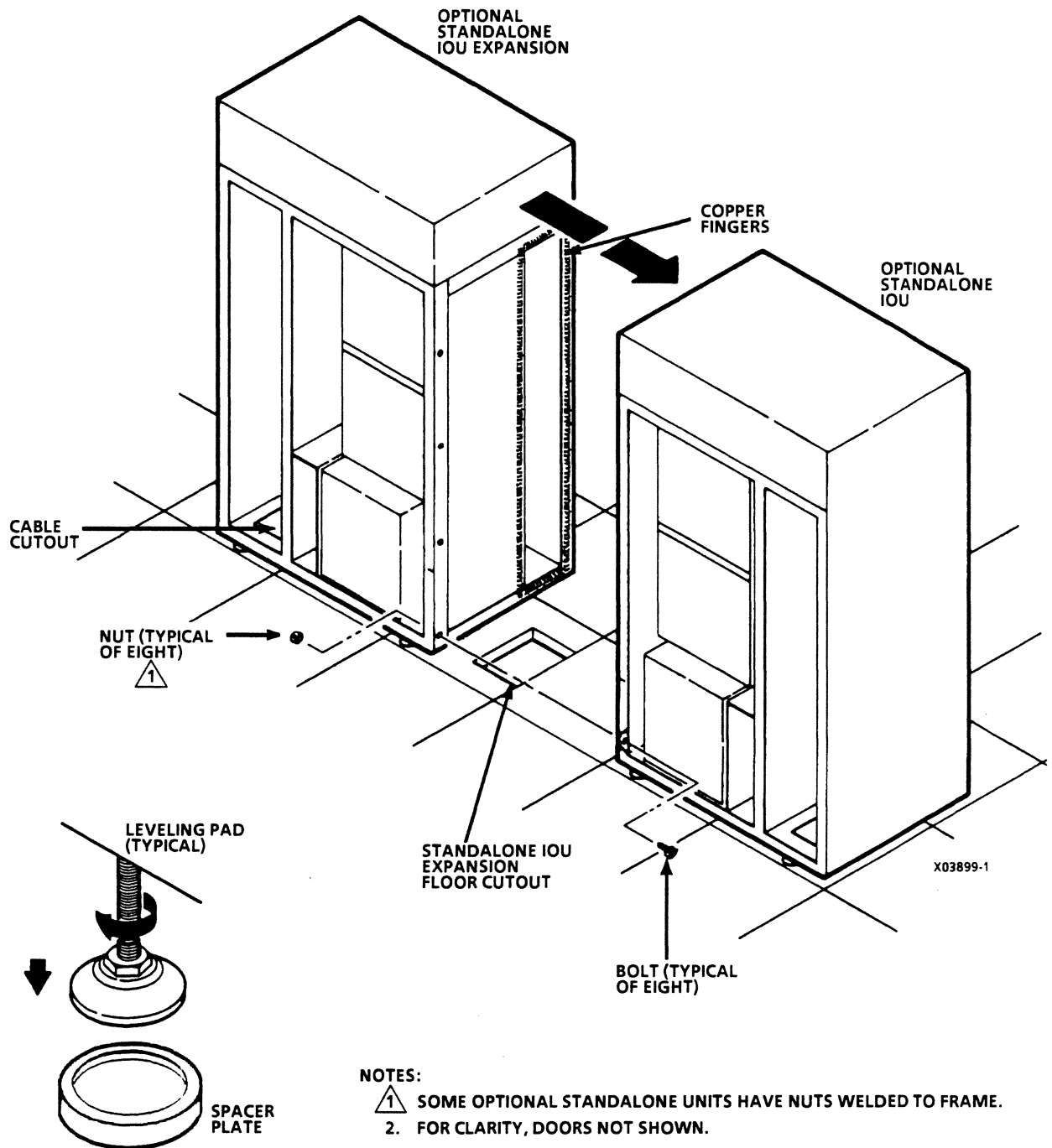


Figure 2-14. Optional Standalone IOU Expansion Bolting

Install IOU Trim Panels

Use this procedure when the optional IOU expansion or optional standalone IOU expansion is present. The procedure is necessary only to install front and rear trim panels between adjacent IOUs.

- ___ 1. Be sure that placement and bolting procedures are completed.
- ___ 2. Remove and unpackage trim panels, shipped inside one IOU.
- ___ 3. Observe trim panel brackets and IOU mounting fixtures to become familiar with panel installation (figure 2-15).
- ___ 4. Place one trim panel against IOU and about 100 mm (4 in) above IOU mounting fixtures.
- ___ 5. Push trim panel in and down to secure panel brackets into IOU mounting fixtures.
- ___ 6. Test that panel is securely mounted by pulling gently on panel corners. If panel is loose:
 - ___ a. Remove panel.
 - ___ b. Tighten panel brackets, if necessary.
 - ___ c. Repeat panel installation.
- ___ 7. Install second trim panel in same manner.
- ___ 8. Install trim panels on optional standalone IOUs.

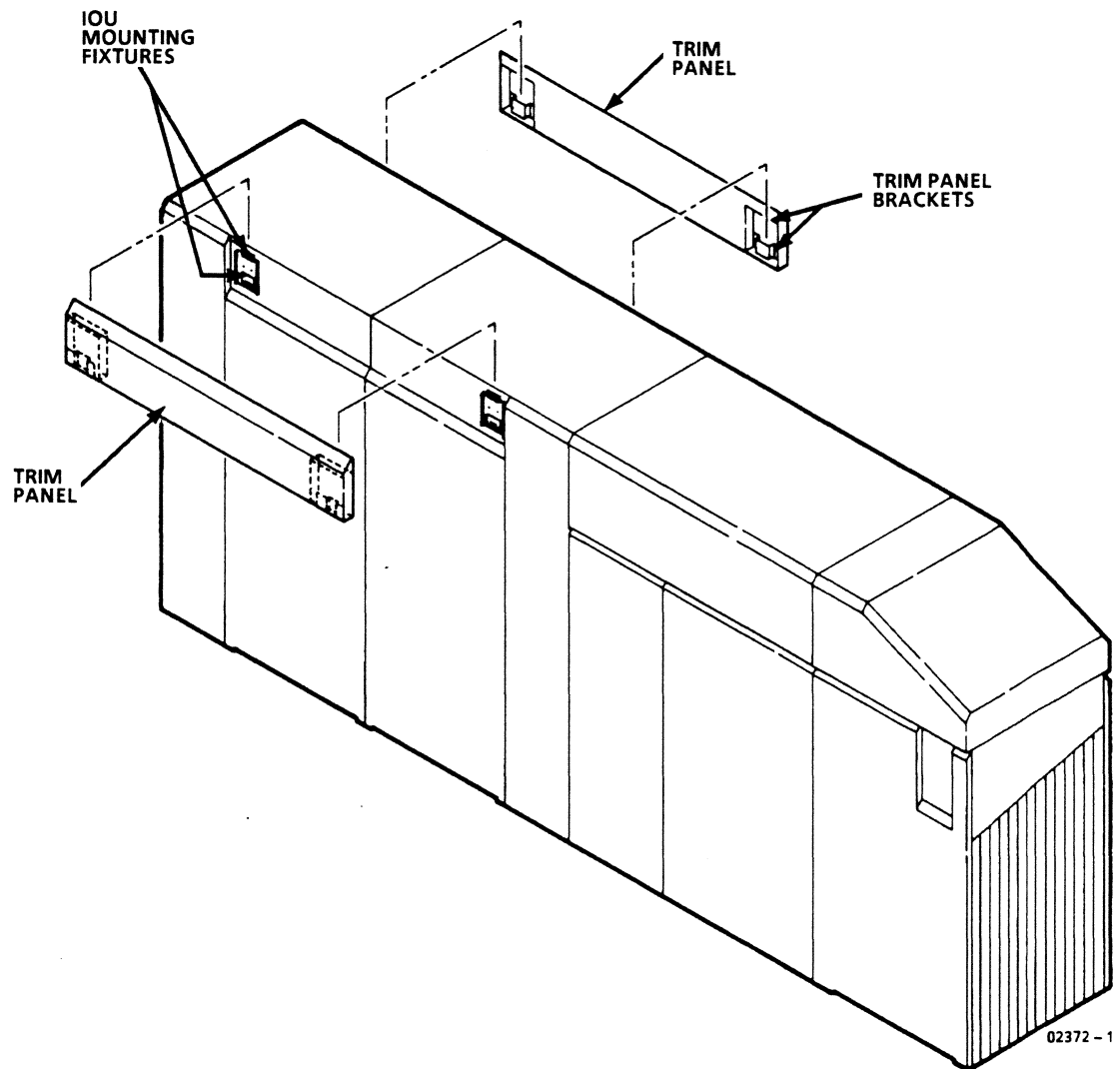


Figure 2-15. IOU Trim Panels

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Connecting Cables

The following procedures describe signal and control cable connections.

- Connect MG Interface Unit Cables to Power Unit
- Connect Power Unit Cables to CPU
- Connect CP-0 and CP-1 Cables to IOU
- Connect Optional IOU Expansion Cables to IOU
- Connect Optional Standalone IOU Cables to CPU
- Connect Optional Standalone IOU Expansion Cables to Standalone IOU
- Connect IOU Power Multiplexer Cables
- Connect Start/Short Warning Cables
- Connect Long Warning Cables
- Connect IOU Channel Cables
- Install System Console Cabling
- Final IOU Cabling

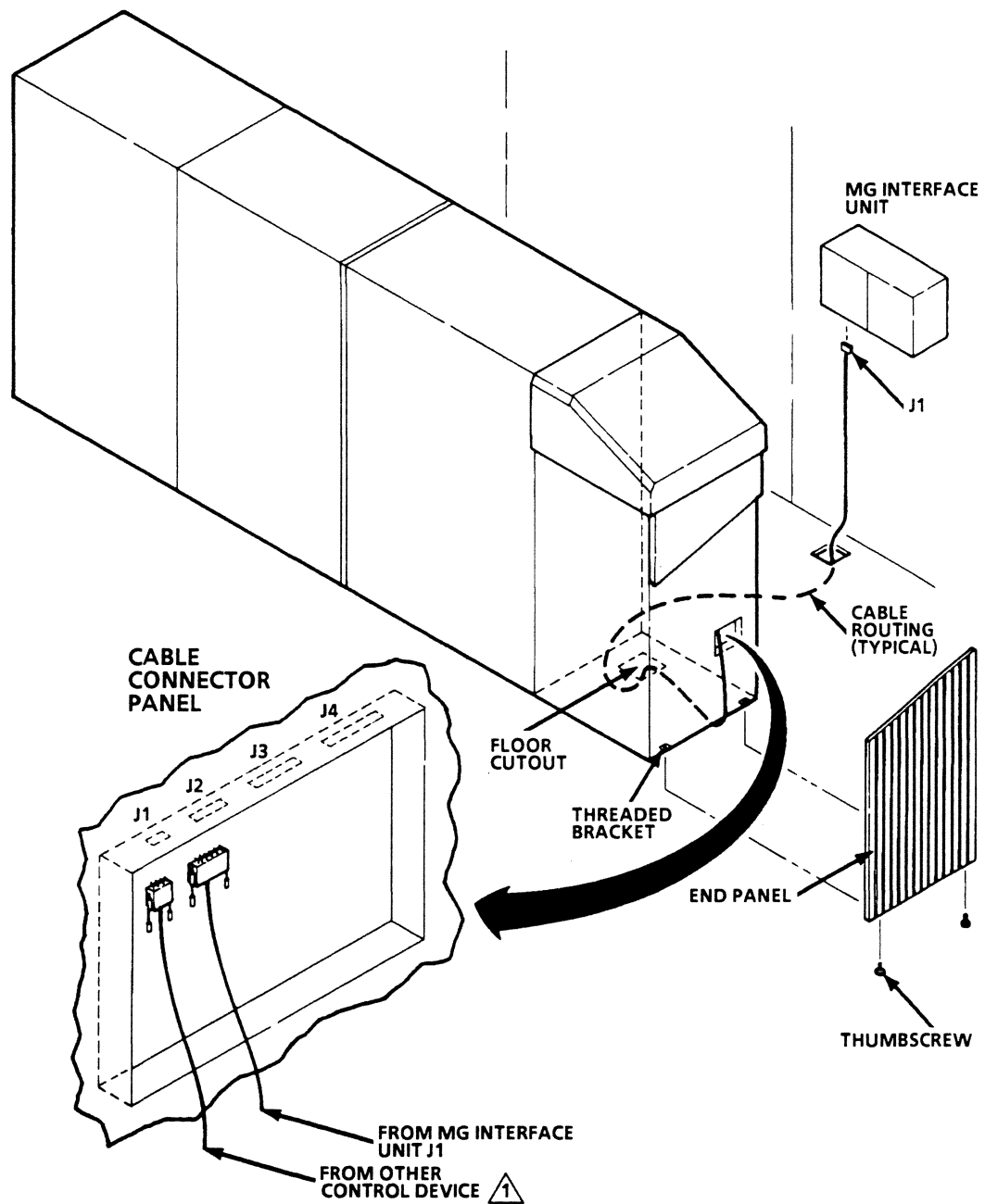
⚠ CAUTION

- When connecting logic cables, wear an antistatic smock and an antistatic wrist strap connected to frame ground to protect microcircuits from damage.
 - Be careful in handling all cables to prevent damage to their connector pins and jacks.
-

Connect MG Interface Unit Cable to Power Unit

Use this procedure to connect control cables from the MG interface unit and from another control device, when used, to the power unit.

- ___ 1. Be sure that MG interface unit installation is completed (installed with MG set).
- ___ 2. Remove end panel from power unit by removing two bottom thumbscrews, moving bottom of panel slightly outward and then down (figure 2-16).
- ___ 3. Route cable from MG interface unit up through floor cutout, under power unit, and up to cable connector panel on power unit. This is a 15.2-m (50-ft) cable (P/N 10292400) that ships with the MG interface unit.
- ___ 4. Remove jumper plug from cable connector panel connector J2.
- ___ 5. Connect cable from MG interface unit to power unit J2.
- ___ 6. Route cable, if present, from other control device up through floor cutout, under power unit, and up to cable connector panel. Instructions for the connection of this cable to other equipment are unique to each site. They are supplied by Control Data as part of special installations.
- ___ 7. Connect other control device cable, if present, to power unit J1.
- ___ 8. Do not install end panel on power unit.



X02360-3

Figure 2-16. MG Interface Cable Connections

Connect Power Unit Cables to CPU

Use this procedure to connect blower and control cables from the power unit to the CPU.

- ___ 1. Be sure that front airflow control panel is removed from the power unit. (Done in a previous procedure.)
- ___ 2. Connect cables from power unit in order listed in table 2-1 to CPU connector header (figure 2-17). Fasten cables with a short-shaft slotted screwdriver.

Table 2-1. Power Unit to CPU Cable Connections

Power Unit	CPU Connector Header
1A2P6	J6
1A2P4	J4
1A2P5	J5
1A2P3	J3

Note:

Shipping location of cables is in lower front corner of CPU.

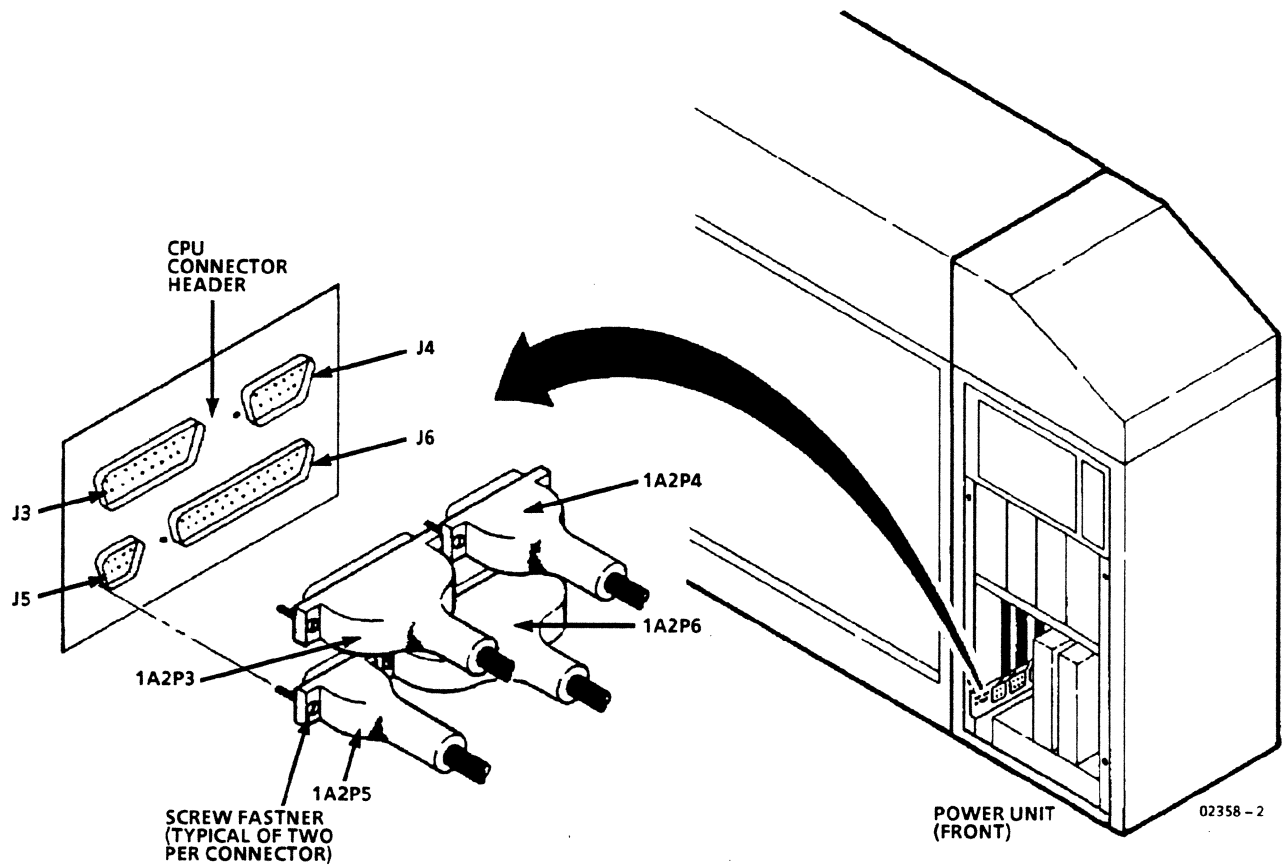


Figure 2-17. Power Unit to CPU Cable Connections

Connect CP-0 and CP-1 Cables to IOU

Use this procedure to route and connect flat logic cables from preconnected side interconnect boards (SIBs) in CP-0 and CP-1 to a header panel in the IOU.

- ___ 1. Be sure that bolting together of units is completed.
- ___ 2. Access SIB cables from bottom and front of CPU (figure 2-18).
- ___ 3. Reseat all previously installed SIB cables by pushing on connector strain relief until connector bottoms into SIB. Connector is fully seated when connector latch/ejectors snap into notches between connector and connector strain relief.
- ___ 4. Remove protective coverings from SIB cable connectors.
- ___ 5. Route color-identified cable groups through unit cable openings into IOU. A later procedure routes and connects a coaxial cable located in the same area.

⚠ CAUTION

To avoid damage to connectors, insert connectors with keyed slots facing left.

- ___ 6. Connect SIB cables to IOU header (hdr) panel, in bottom to top order as listed in table 2-2.

Table 2-2. SIB to IOU Header Panel Cable Connections

Blue Group		Red Group		Orange Group		Yellow Group		Green Group	
SIB Cable ¹	IOU Hdr	SIB Cable ¹	IOU Hdr	SIB Cable ¹	IOU Hdr	SIB Cable ¹	IOU Hdr	SIB Cable ¹	IOU Hdr
P76	J76	P62	J62	P59	J59	P53	J53	P50	J50
P77	J77	P63	J63	P60	J60	P54	J54	P51	J51
P78	J78	P64	J64	P61	J61	P55	J55	P52	J52
		P65	J65			P56	J56	P70	J70
		P66	J66			P57	J57	P71	J71
		P67	J67			P58	J58	P72	J72
(Note ²)				(Note ³)					

Notes:

1. Cables ship in bottom left end of CPU.
 2. These connections apply only when optional CP-1 is present, as indicated by the presence of CP-1 logic modules.
 3. IOU header connectors J73, J74, and J75 are unused.
-

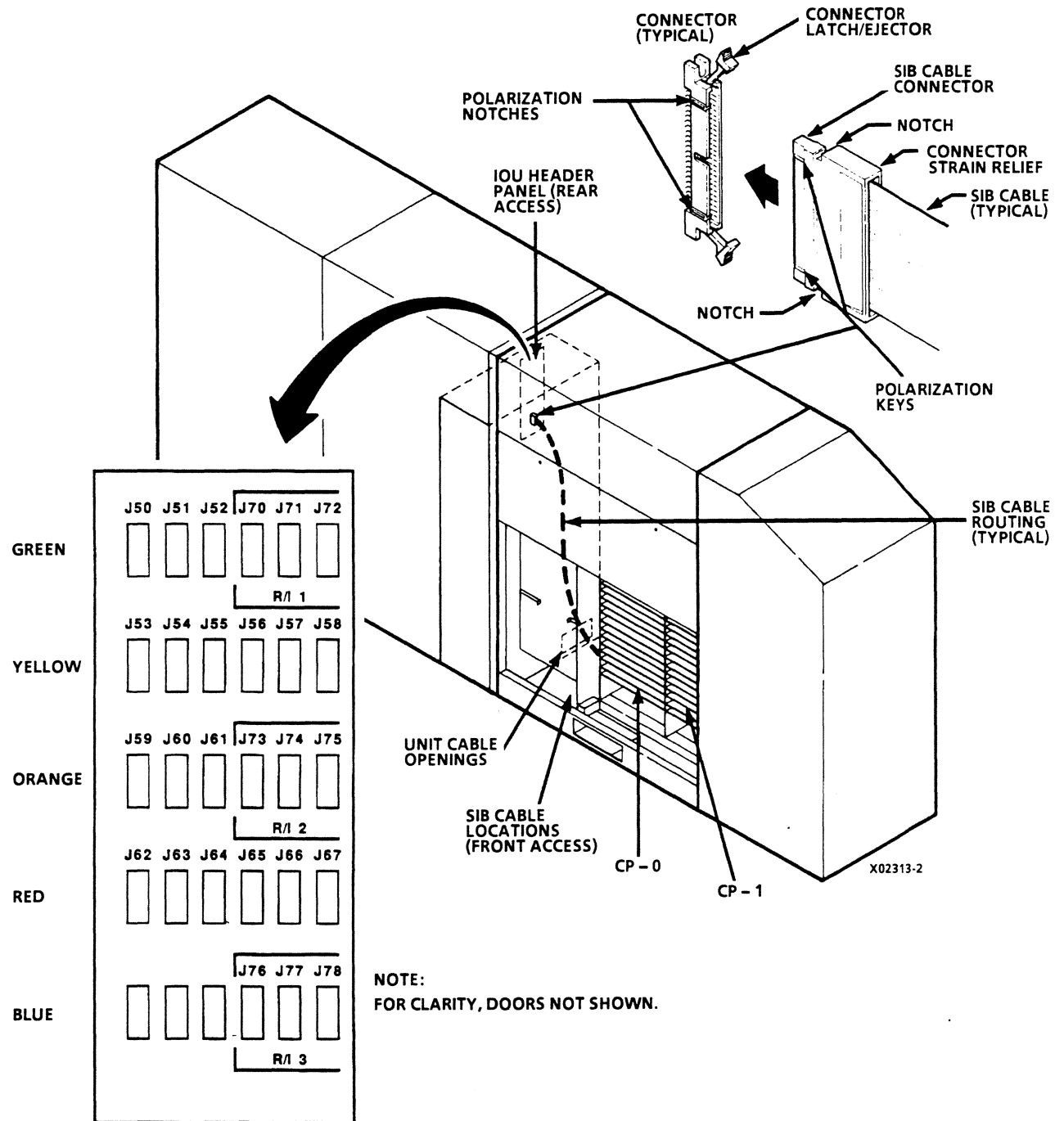


Figure 2-18. CP-0/CP-1 to IOU Cable Connections

- ___ 7. Fasten cables through strain relief, located above cable connections (figure 2-19).
- ___ 8. Locate ribbon cable support plate.
- ___ 9. Remove left nut from cable clamp. Loosen right nut far enough to allow clamp to hang down from right stud.
- ___ 10. Place cables between support plate and clamp. Tighten clamp nuts enough so clamp will support weight of cables, but not crush them.

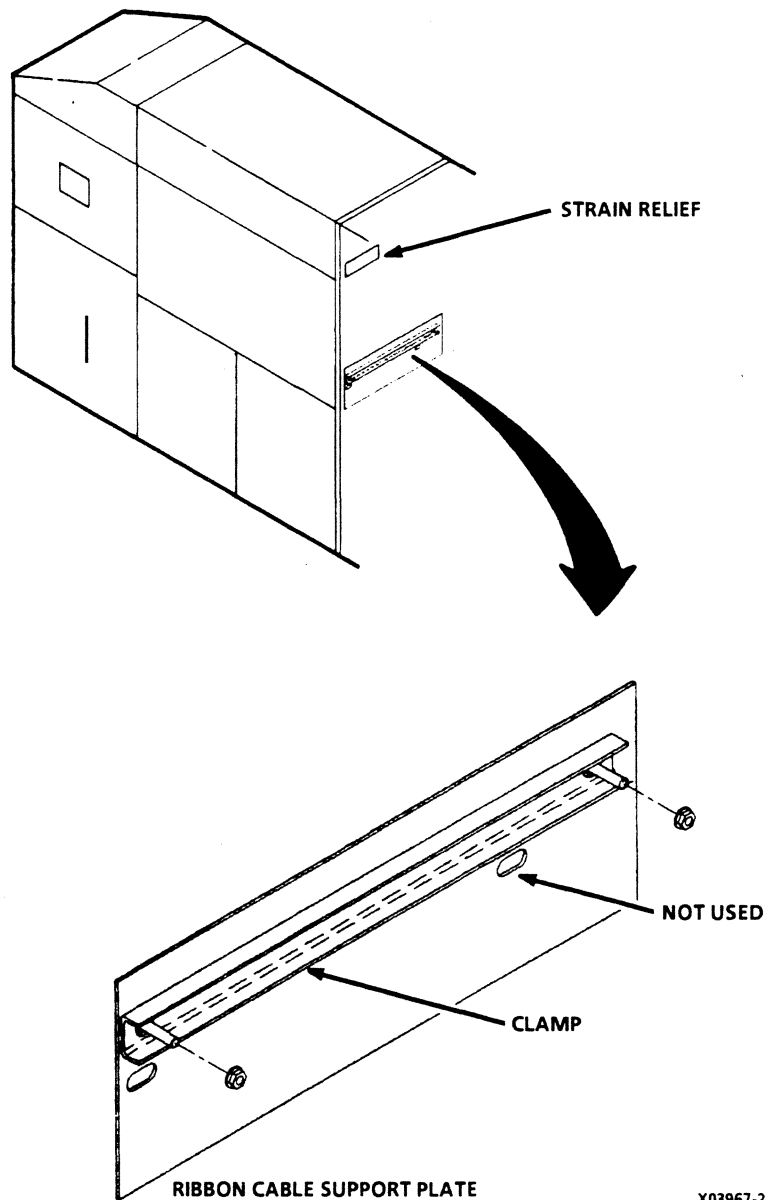


Figure 2-19. Strain Relief and Cable Support Plate

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Connect Optional IOU Expansion Cables to IOU

Use this procedure to connect logic cables from the backpanels of the optional IOU expansion to the IOU connector panel.

- ___ 1. Be sure that bolting together of units is completed.
- ___ 2. Cut restraint from connector J28 and shipping bracket in IOU expansion (figure 2-20).
- ___ 3. Remove protective cover from connector and connect it to J28 on IOU connector panel.
- ___ 4. Work from lower to higher numbered connectors, cutting each from shipping bracket and connecting it to IOU connector panel in same manner and in order as listed in table 2-3.

Table 2-3. Optional IOU Expansion Cable Connections

Optional IOU Expansion Shipping Bracket	IOU Connector Panel
J28	J28
J29	J29
J30	J30
J31	J31
J32	J32
J33	J33 ¹
J34	J34 ¹
J35	J35 ¹
J36	J36 ¹
J37	J37 ¹
J38	J38 ¹
J39	J39 ¹

Note:

1. Cable connections J33 through J39 apply only to CYBER 960 and are unused in CYBER 962.

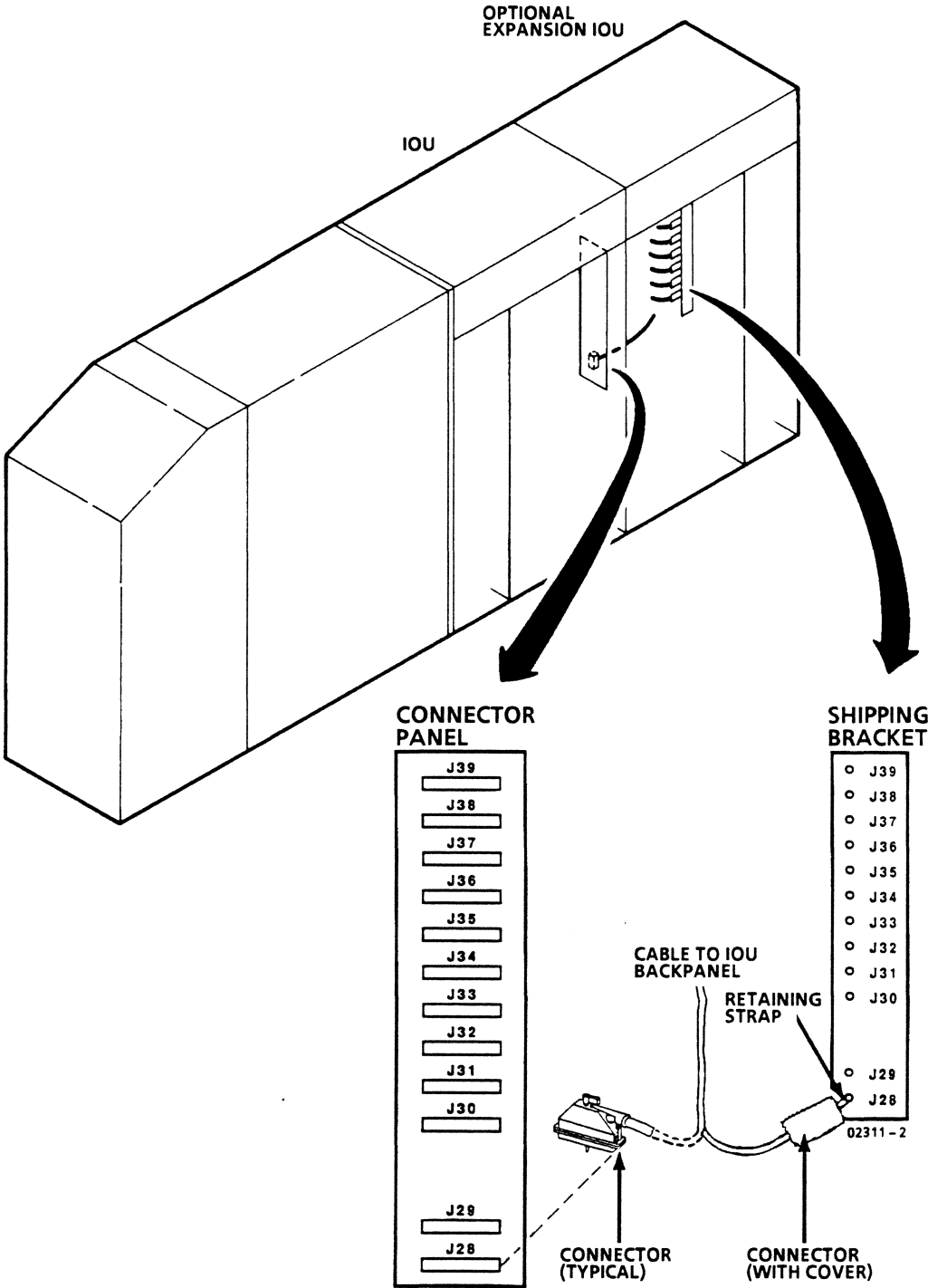


Figure 2-20. Optional IOU Expansion to IOU Cable Connections

Connect Optional Standalone IOU Cables to CPU

Use this procedure to connect logic and clock cables between the CPU and optional standalone IOU.

WARNING
--

This procedure has been reviewed, but has not been verified. Exercise caution to avoid injury to personnel or damage to equipment.

- ___ 1. Remove cable clamps (figure 2-21) from SIB cables on bottom of CP-0 and CP-1 (if present).
- ___ 2. Loosen or remove SIB cable clamp mounting brackets.
- ___ 3. Unplug all SIB cables (except SIBB-to-SIBC cables) from SIBs A through D (if present). Lay cables in bottom of CP.

Connect Optional Standalone IOU Cables to CPU

Use this procedure to connect logic and clock cables between the CPU and optional standalone IOU.

- ___ 1. Remove cable clamps (figure 2-21) from SIB cables on bottom of CP-0 and CP-1 (if present).
- ___ 2. Loosen or remove SIB cable clamp mounting brackets.
- ___ 3. Unplug all SIB cables (except SIBB-to-SIBC cables) from SIBs A through D (if present). Lay cables in bottom of CP.

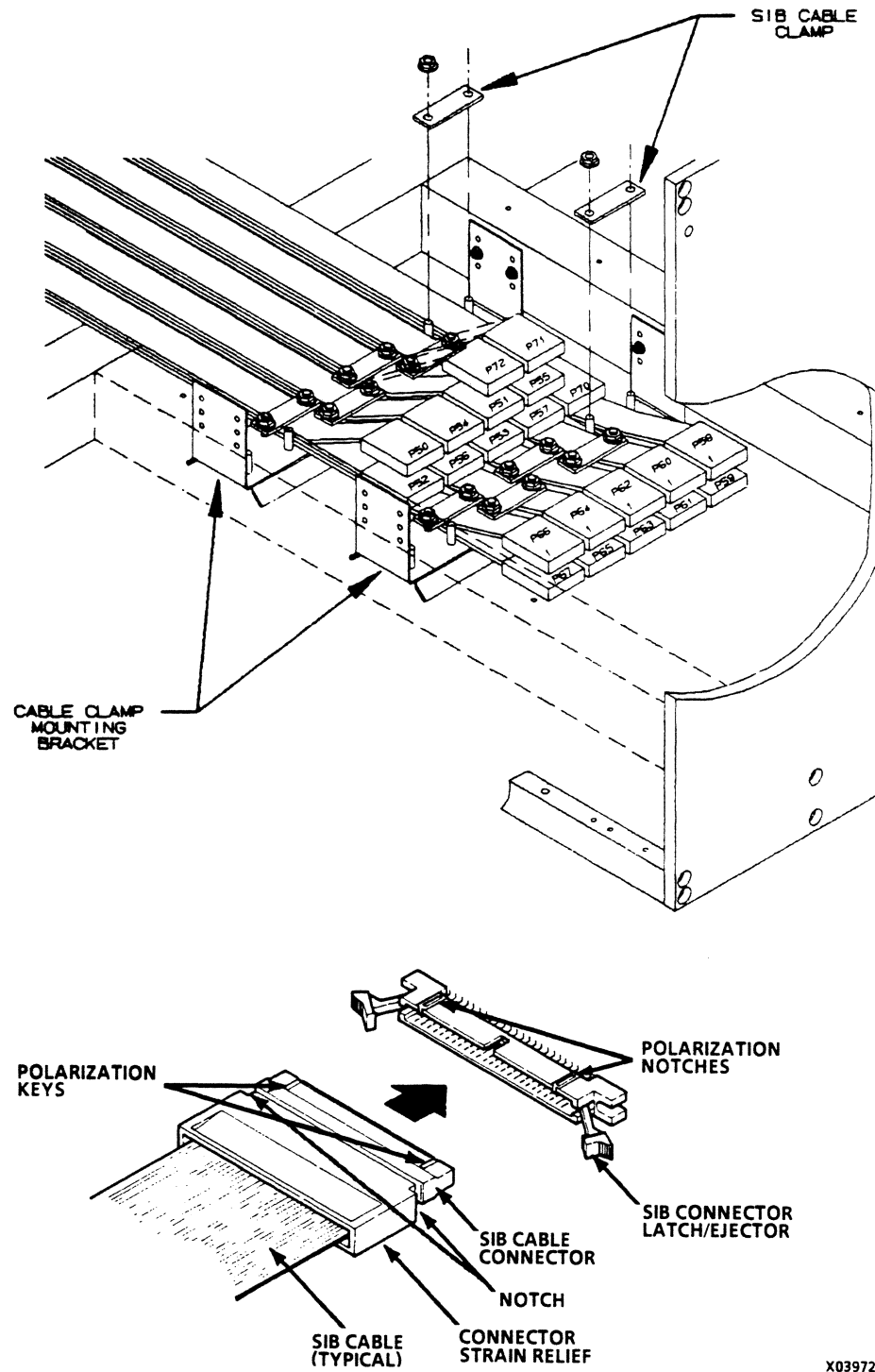


Figure 2-21. SIB Cable Clamps and Mounting Brackets

- 4. Place three ribbon cable bundles (shipped with equipment) beneath raised floor between CPU and standalone IOU (figure 2-22).

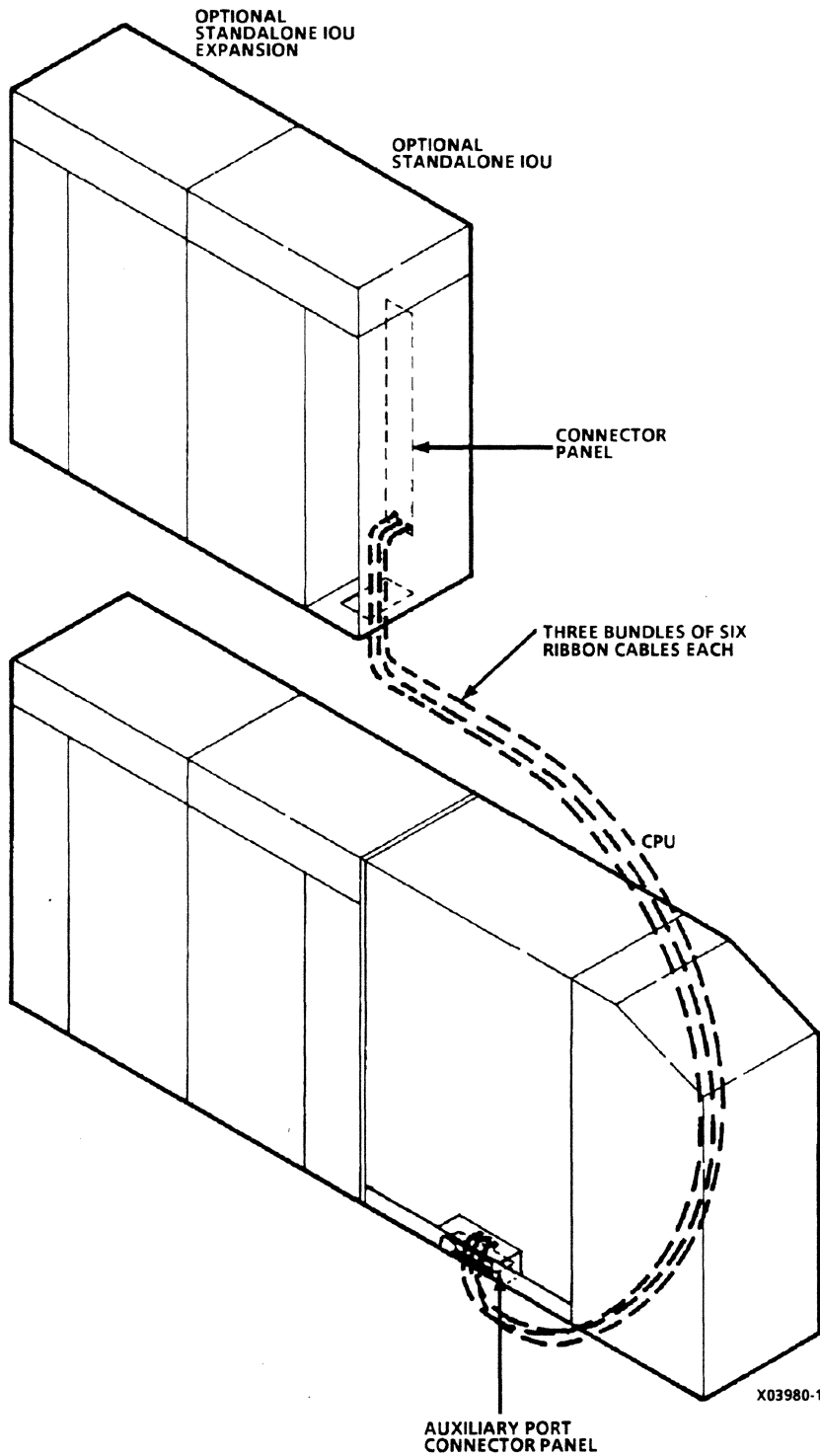


Figure 2-22. Place CPU to IOU Cable Bundles

NOTE

Attach EMI gasketing to cable bundle mounting plates after placing cables beneath the floor, but before feeding cables into either the CP or the IOU.

- 5. Pull IOU-to-CP cable bundles up through cutouts in adapter plate and into bottom of CP cage.

NOTE

Note which bundle feeds through which adapter plate cutout.

- 6. Feed cable bundles first through left cutout, then right cutout, then center cutout as shown in figure 2-23.
- 7. Mount three IOU-to-CP cable bundle mounting plates to adapter plate.

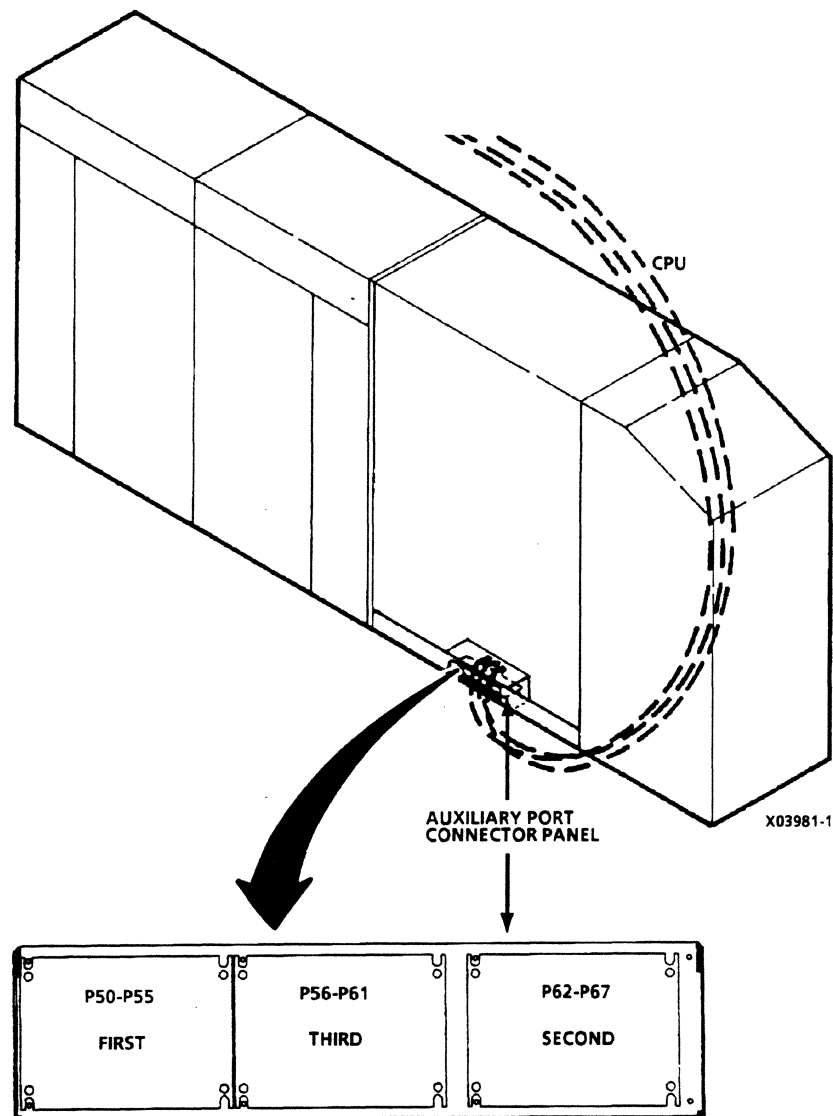


Figure 2-23. Mounting Cables to Adapter Plate

- 8. Route IOU-to-CP cables to destinations (AUXJ50 - AUXJ57 to SIBA, AUXJ58 - AUXJ67 to AUXJ58 0 - AUXJ67 0 on Remote IOU Interface Module) according to labels on cable connectors.
- 9. Connect cables to SIBA (figure 2-24). Pull cables to Remote IOU Interface Module out front of mounting box or CP-1, whichever applies. Cables are not connected until a later procedure.

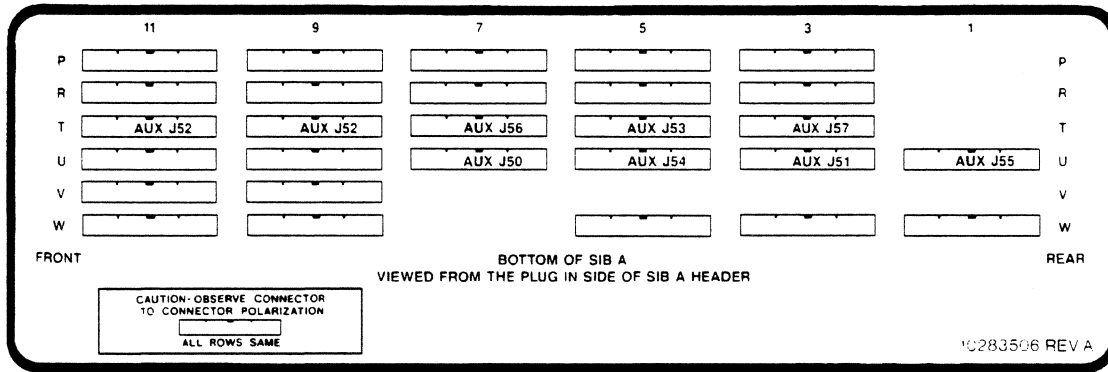
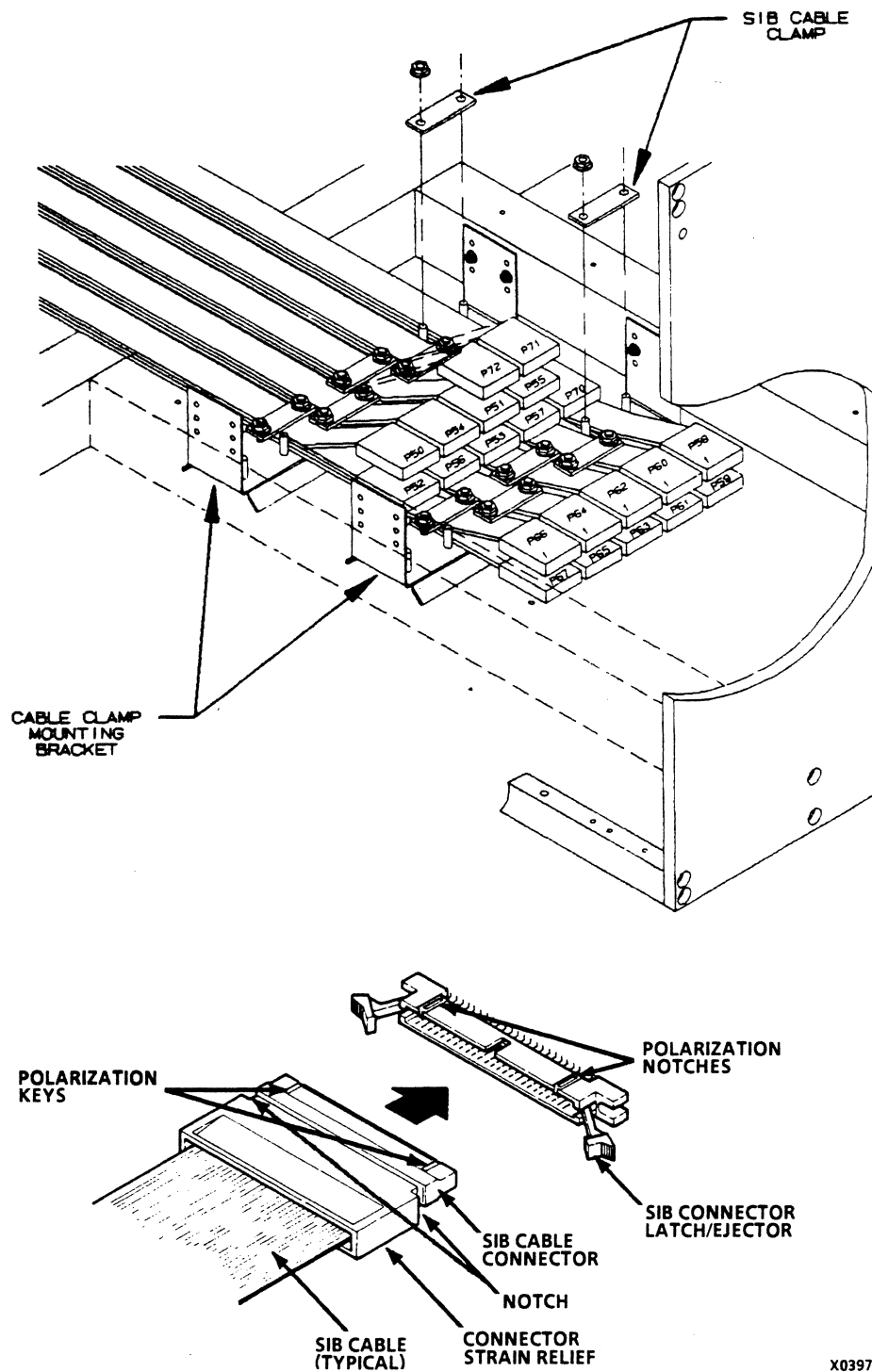


Figure 2-24. IOU-to-CP Cable Destination

- ___ 10. Tighten or install SIB cable clamp mounting brackets in bottom of CPs (figure 2-25).



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Figure 2-25. SIB Cable Clamps

- ___ 11. Locate ten SIBB-to-Remote IOU Interface Module SIB cables in installation kit.
- ___ 12. Place cables in bottom of CP, and connect SIBB ends as labeled to AUXJ58 through AUXJ67 (figure 2-26). Pull other ends out of front of either CP-1 or Remote IOU Interface Module mounting box, whichever applies.
- ___ 13. Connect SIB cables removed earlier to SIB boards. Connect as labeled, from bottom to top, and from back to front. Start with SIB A and proceed to SIB D (if present). Replace SIB cable clamps as each row is connected.

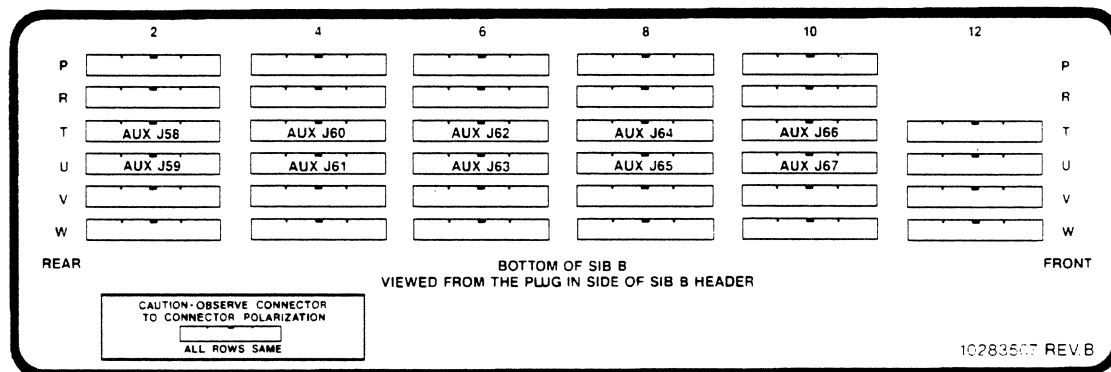
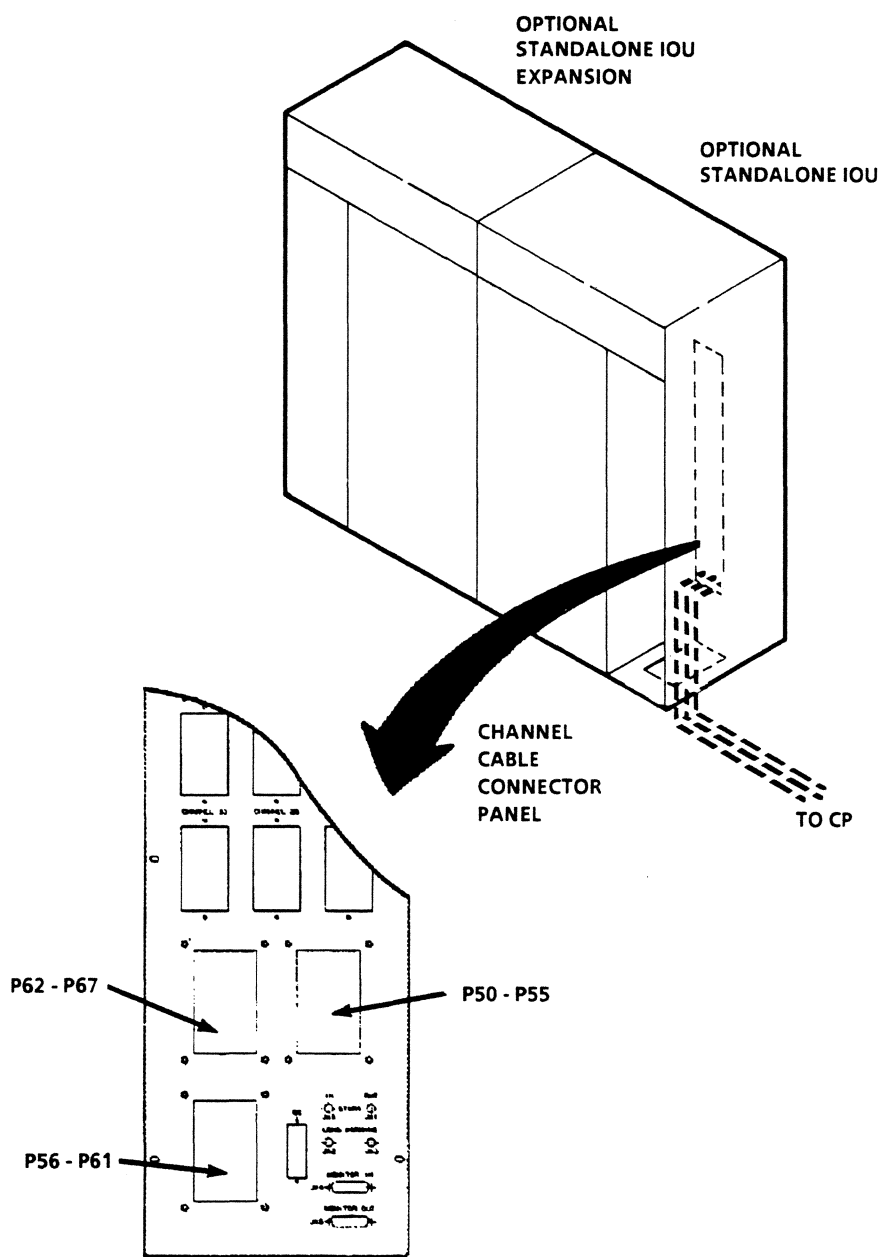


Figure 2-26. SIB Cable Location

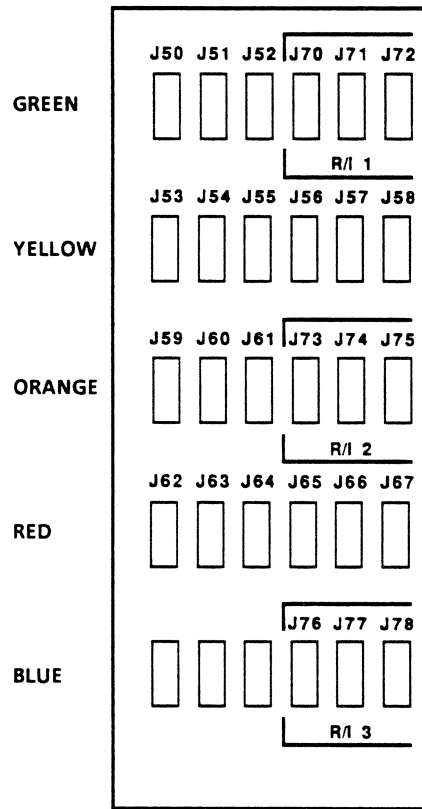
- ___ 14. Pull other end of cables up into standalone IOU.
- ___ 15. Feed cables through cutouts in IOU channel cable connector panel and mount cable bundle mounting plates to connector panel (figure 2-27).



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Figure 2-27. Cable Bundle Mounting Plate Location

- ___ 16. Route cables up to IOU header (hdr) panel and connect as labeled and as shown (figure 2-28).



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Figure 2-28. IOU-to-CP Cable Connections in IOU

To present the information in this chapter in a structured format, this page has been left blank.

Connect Optional Standalone IOU Expansion Cables to Standalone IOU

Use this procedure to connect logic cables from the backpanels of the optional standalone IOU expansion to a connector panel in the optional standalone IOU.

- ___ 1. Be sure that standalone units are bolted together.
- ___ 2. Cut shipping restraint from connector J28 and shipping bracket in standalone IOU expansion (figure 2-29).
- ___ 3. Remove protective cover from connector and connect it to J28 on IOU connector panel.
- ___ 4. Work from lower to higher numbered connectors, cutting each from shipping bracket and connecting it to IOU connector panel in same manner and in order listed in table 2-4.

Table 2-4. Optl Standalone IOU Exp to Optl Standalone IOU Cable Connections

Optional Standalone IOU Expansion Shipping Bracket¹	Optional Standalone IOU Connector Panel
J28	J28
J29	J29
J30	J30
J31	J31
J32	J32

Note:

1. Cables are shipped attached to shipping bracket in optional standalone IOU expansion.

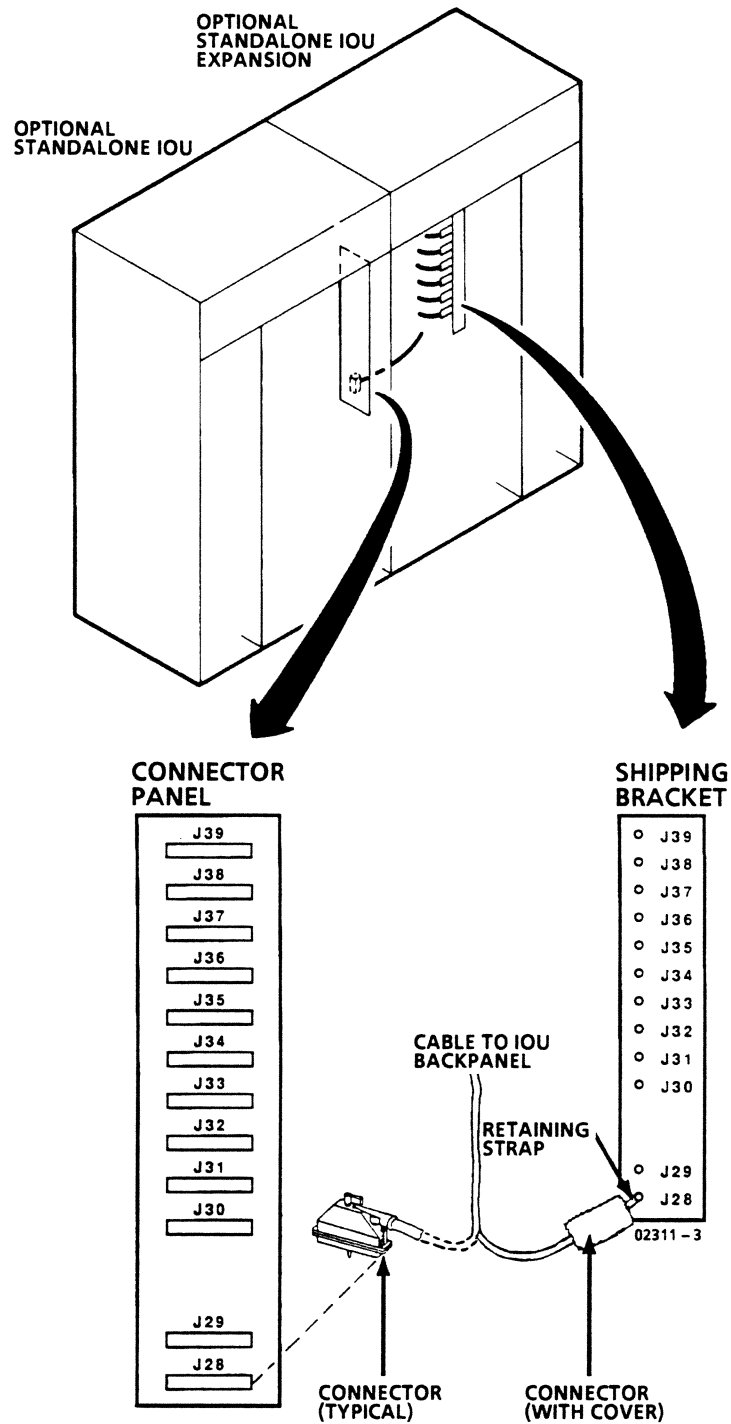


Figure 2-29. Optional Standalone IOU Expansion to Standalone IOU Cable Connections

Connect IOU Power Multiplexer Cables

Use this procedure to route and connect IOU power multiplexer cables from the CPU to the IOU and from the IOU to the optional IOUs.

- ___ 1. Route and connect cables as listed in table 2-5 and shown in figure 2-30. Cables route within units, except for cable between optional IOU expansion (exp) and optional standalone IOU, which routes under raised floor.
- ___ 2. Use cable ties, as necessary, inside units to hold cables in place.

Table 2-5. IOU Power Multiplexer Cable Connections

From	To	Cable Shipping Location	Cable P/N, Length
CPU J3 (Note ¹)	IOU mux bd J5 (Note ¹)	In bottom of CPU.	22133977, 6.1 m (20 ft)
IOU mux bd J6	Optl IOU exp mux bd J5 (Note ¹)	In optl IOU exp.	
Optl IOU exp mux bd J6	Optl IOU exp connector panel J44 (rear)	In optl IOU exp; cable is preinstalled.	
Optl IOU exp connector panel J44 (front)	Optl standalone IOU connector panel J44 (front) (Note ¹)	In optl standalone IOU.	23107064, 15.2 m (50 ft)
Optl standalone IOU connector panel J44 (rear)	Optl standalone IOU mux bd J5	In optl standalone IOU; cable is preinstalled.	
Optl standalone IOU mux bd J6	Optl standalone IOU exp mux bd J5 (Note ¹)	In optl standalone IOU exp.	
Optl standalone IOU exp mux bd J6 (Note ¹)	Optl standalone IOU exp connector panel J44 (rear)	In optl standalone IOU exp; cable is preinstalled.	

Note:

1. Cable ships preconnected at this end.

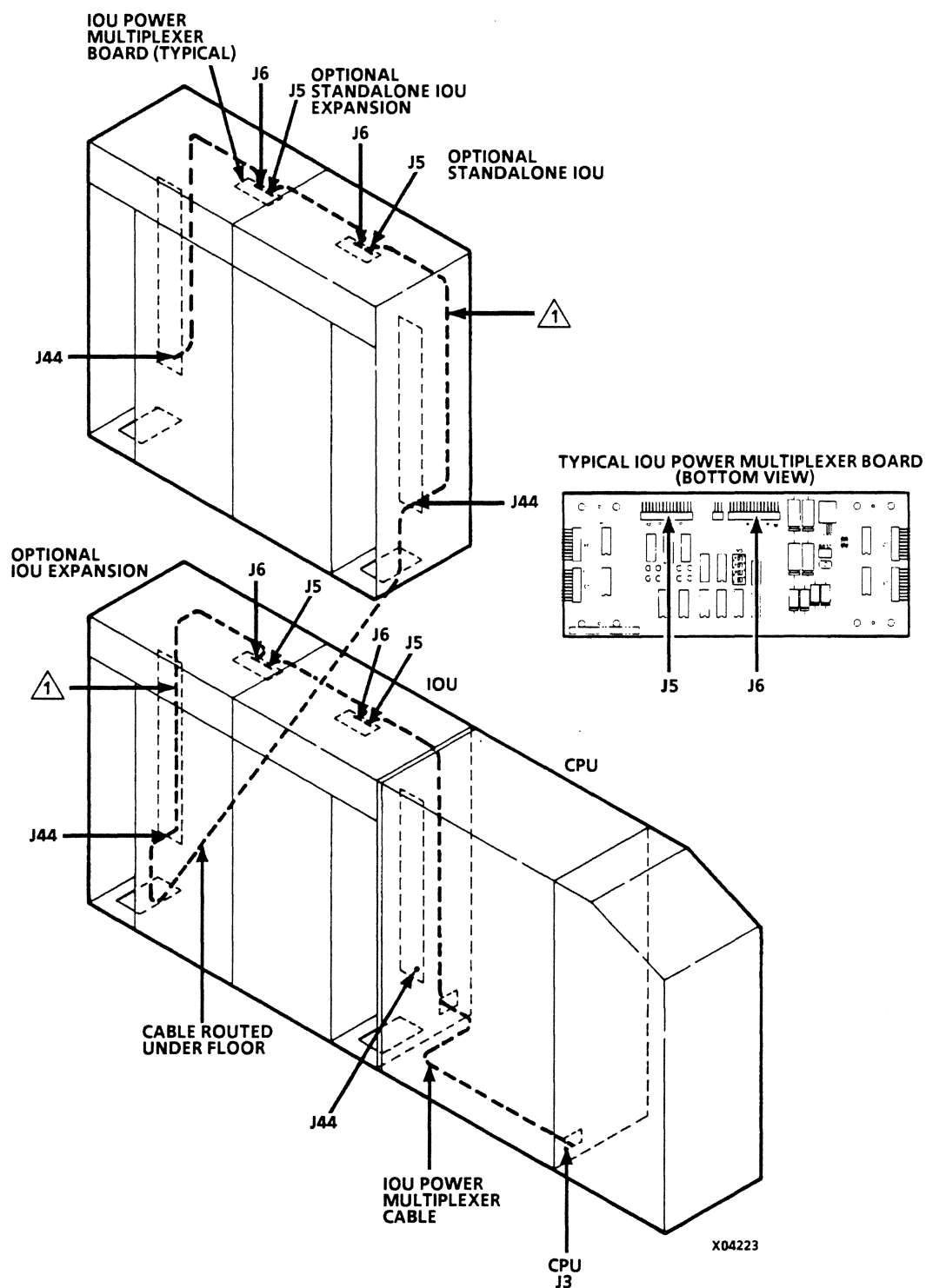


Figure 2-30. IOU Power Multiplexer Cable Connections

Connect Start/Short Warning Cables

Use this procedure to route and connect start/short warning cables between the CPU and IOU and to the optional IOUs.

- ___ 1. Identify IOU configuration being installed with one of the tables (2-6 through 2-9) and one of the figures (2-31 through 2-34).
- ___ 2. Connect cables as listed in identified table and figure.
 - ___ a. Route cables that go between units under raised floor and through floor and unit cutouts.
 - ___ b. Install cable ties, as necessary, inside units to hold cables in place.

Table 2-6. Start/Short Warning Cable Connections (One IOU)

From	To	Cable P/N, Length
CPU J7	IOU connector panel J40	53615356, 3 m (10 ft)
IOU connector panel J41	CPU J8	53615356, 3 m (10 ft)

Note:

Cables are shipped preconnected at one end.

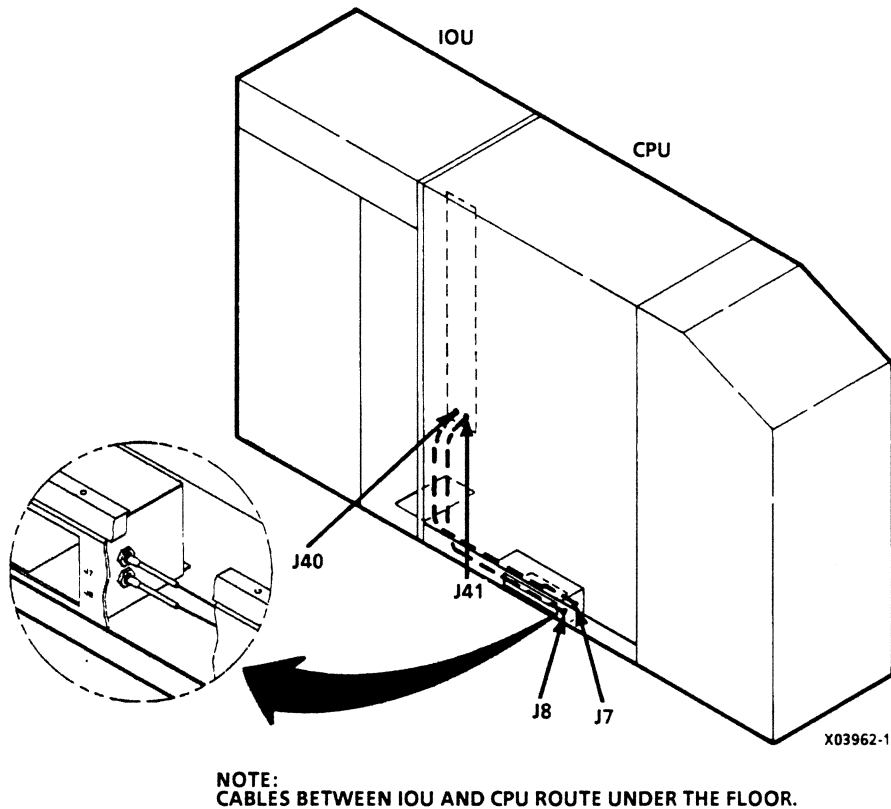
**Figure 2-31. Start/Short Warning Cable Connections (One IOU)**

Table 2-7. Start/Short Warning Cable Connections (Two IOUs)

From	To	Cable P/N, Length
CPU J7	IOU connector panel J40	53615356, 3 m (10 ft)
IOU connector panel J41	Optl IOU exp connector panel J40	53615356, 3 m (10 ft)
Optl IOU exp connector panel J41	CPU J8	53615357, 15.2 m (50 ft)

Note:

Cables are shipped preconnected at one end.

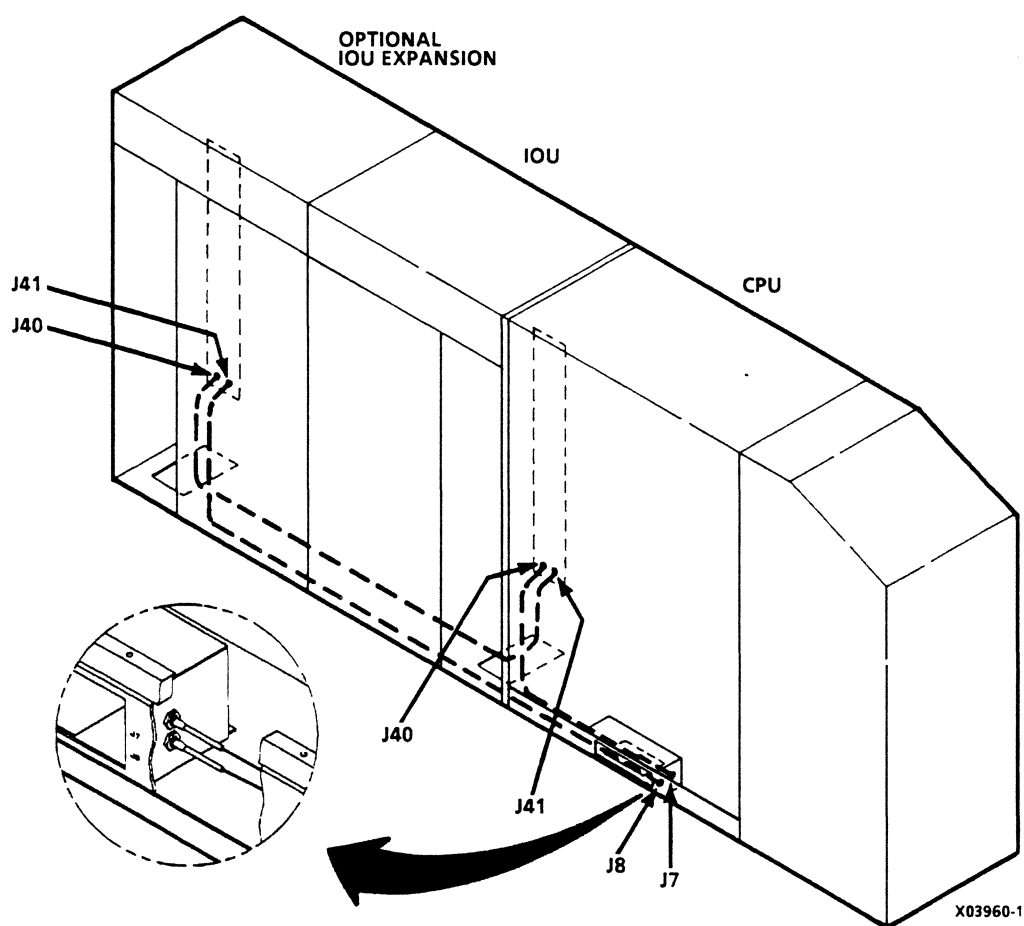
**Figure 2-32. Start/Short Warning Cable Connections (Two IOUs)**

Table 2-8. Start/Short Warning Cable Connections (Three IOUs)

From	To	Cable P/N, Length
CPU J7	IOU connector panel J40	53615356, 3 m (10 ft)
IOU connector panel J41	Optl IOU exp connector panel J40	53615356, 3 m (10 ft)
Optl IOU exp connector panel J41	Optl standalone IOU connector panel J40	53615357, 15.2 m (50 ft)
Optl standalone IOU J41	CPU J8	53615357, 15.2 m (50 ft)

Note:

Cables are shipped preconnected at one end.

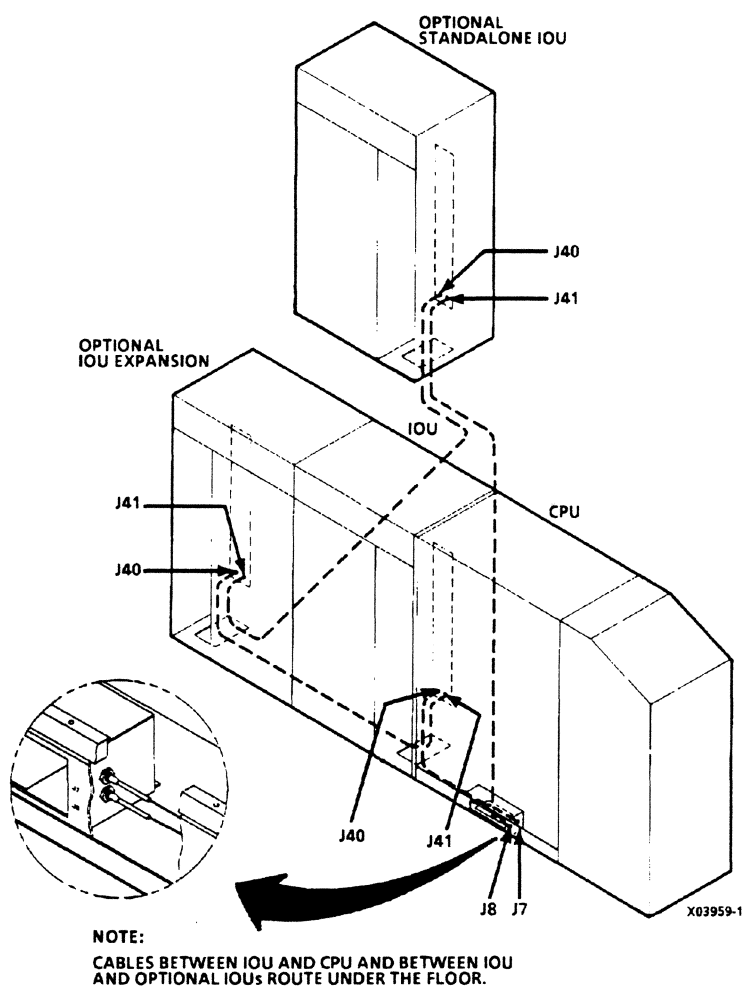
**Figure 2-33. Start/Short Warning Cable Connections (Three IOUs)**

Table 2-9. Start/Short Warning Cable Connections (Four IOUs)

From	To	Cable P/N Length
CPU J7	IOU connector panel J40	53615356, 3 m (10 ft)
IOU connector panel J41	Optl IOU exp connector panel J40	53615356, 3 m (10 ft)
Optl IOU exp connector panel J41	Optl standalone IOU connector panel J40	53615357, 15.2 m (50 ft)
Optl standalone IOU connector panel J41	Optl standalone IOU exp connector panel J40	53615357, 15.2 m (50 ft)
Optl standalone IOU exp connector panel J41	CPU J8	53615357, 15.2 m (50 ft)

Notes:

Cables are shipped preconnected at one end.

Optional standalone IOU expansion is shipped with and extra cable. Keep the extra cable on site for a spare.

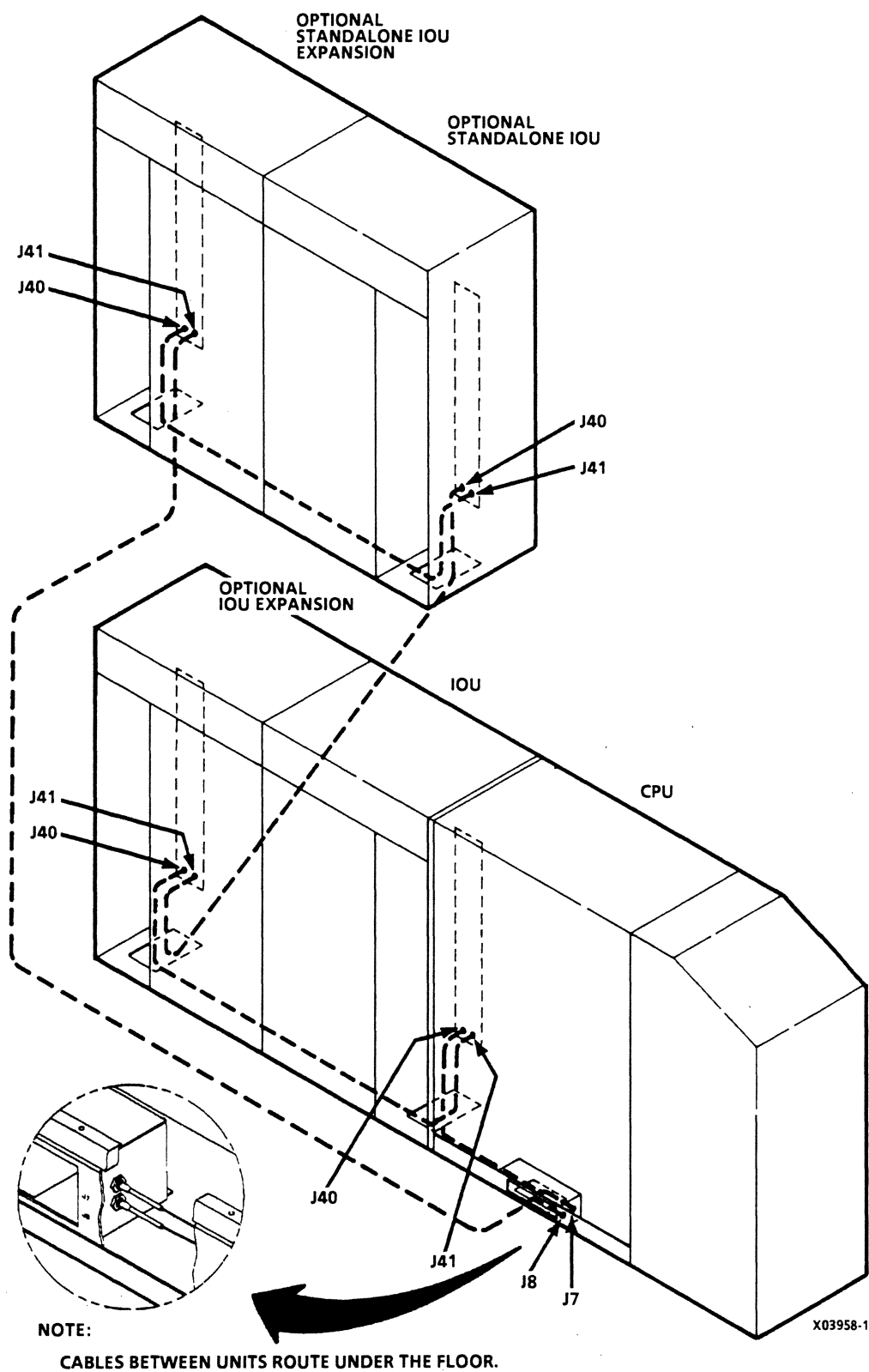


Figure 2-34. Start/Short Warning Cable Connections (Four IOUs)

Connect Long Warning Cables

Use this procedure to route and connect long warning cables between the IOU and optional IOUs.

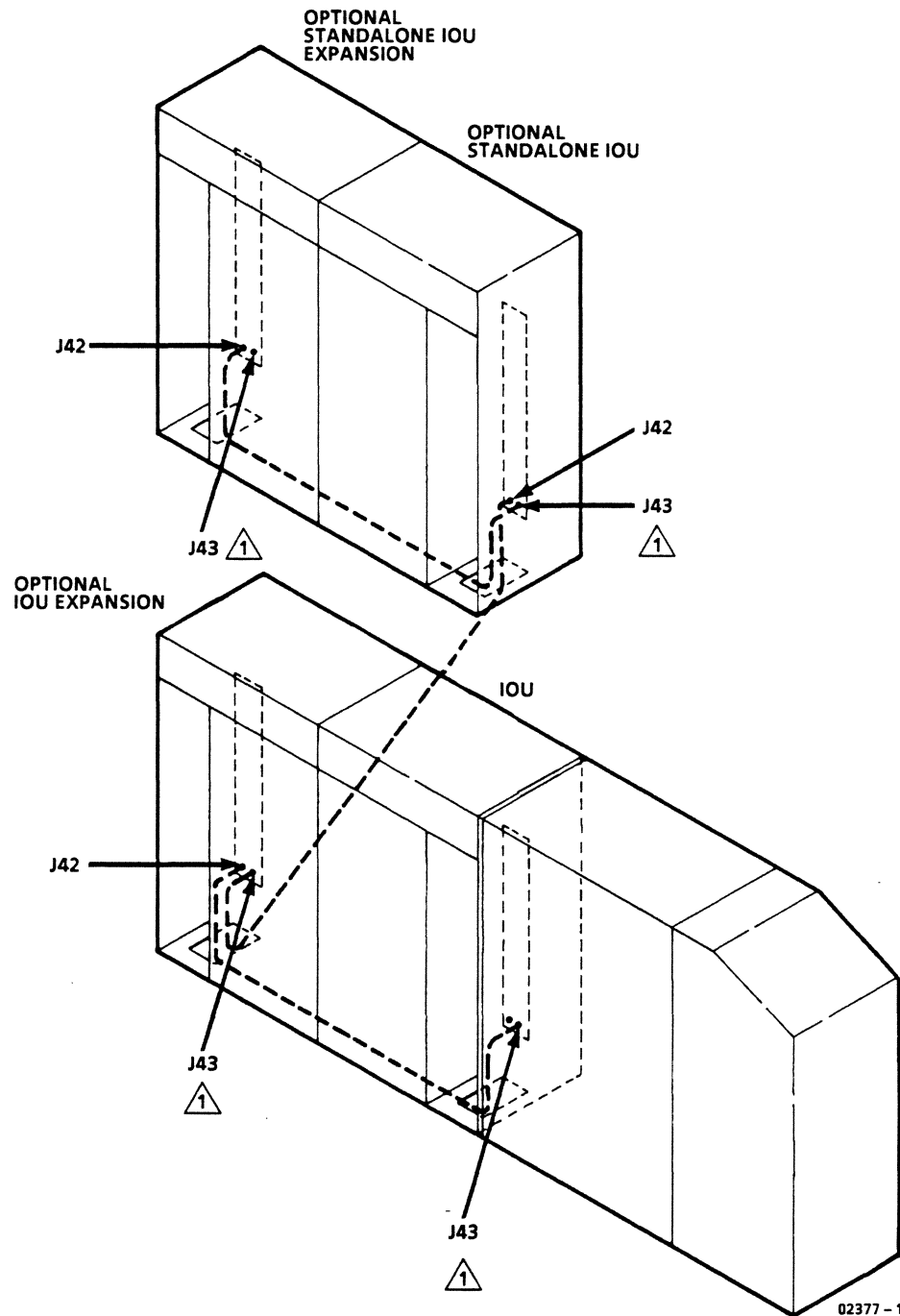
- ___ 1. Route and connect cables as listed in table 2-10 and shown in figure 2-35.
Cables route under floor.
- ___ 2. Install cable ties, as necessary, to hold cables in place.

Table 2-10. Long Warning Cable Connections

From ¹	To ¹	Cable P/N, Length
IOU J43	Terminator ² or optl IOU expansion J42	53615356, 3 m (10 ft)
Optl IOU expansion J43	Terminator ² or optl standalone IOU J42	53615357, 15.2 m (50 ft)
Optl standalone IOU J43	Terminator ² or optl standalone IOU expansion J42	53615356, 3 m (10 ft)
Optl standalone IOU expansion J43	Terminator ^{2,3}	

Notes:

1. Cables are shipped preconnected at one end.
2. The terminator (P/N 23102122) ships preconnected to the last J43 in the series of connections.
3. Optional standalone IOU expansion ships with an extra terminator. Keep the extra terminator on site as a spare.



NOTES:

1. CONNECTOR J43 REQUIRES INSTALLATION OF A SUPPLIED TERMINATOR WHEN J43 DOES NOT CONNECT TO ANOTHER UNIT.
2. CABLES BETWEEN IOU AND CPU AND BETWEEN IOU AND OPTIONAL IOUs ROUTE UNDER THE FLOOR.

Figure 2-35. Long Warning Cable Connections

Connect IOU Channel Cables

Use this procedure to connect cables to the cable connector panels in the IOU and optional IOUs and to record the cable connections for future reference.

- ___ 1. Connect channel cables to each IOU connector panel (figure 2-36) from bottom to top order to permit best accessibility to panel connectors.
- ___ 2. Record each connection for future reference in tables 2-11 through 2-14.

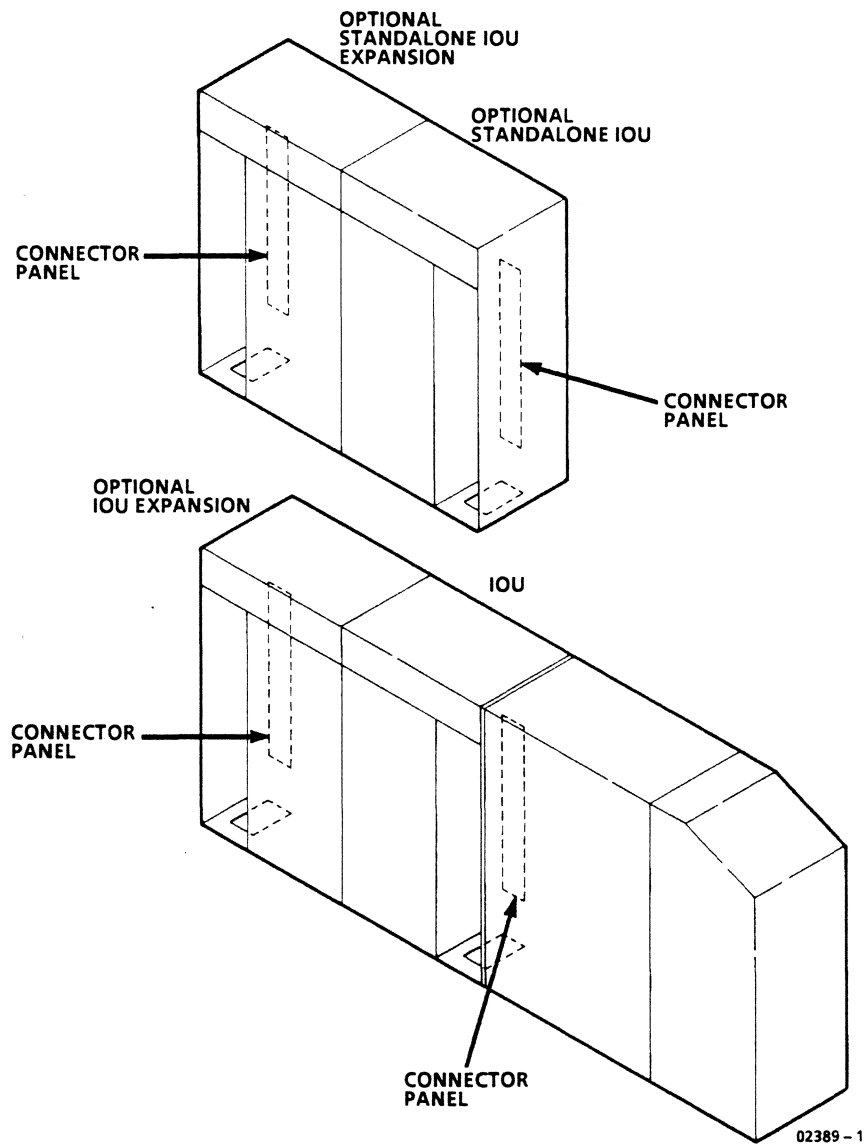


Figure 2-36. IOU Channel Cable Connector Panels

Table 2-11. IOU Channel Cable Connections

[illegible]

Table 2-12. Optional IOU Expansion Channel Cable Connections

[illegible]

Table 2-13. Optional Standalone IOU Channel Cable Connections[illegible]

Table 2-14. Optional Standalone IOU Expansion Channel Cable Connections

Channel Number		Peripheral Equipment	
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
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CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____
CHANNEL	_____	_____	_____

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Install System Console Cabling

Use this procedure to connect signal cabling from the system console to the IOU, optional standalone IOU, and power unit.

For additional installation and operation information of the system console, refer to the System Console Operations/Maintenance manual packaged with the system console.

- ___ 1. Be sure that site 50/60-Hz power for the system console power is off.
- ___ 2. Connect cables as follows:
 - ___ a. Locate cables shipped in IOUs and power unit.
 - ___ b. Locate power unit-to-system console cable, removed from shipping location in power unit in a previous procedure.
 - ___ c. Place system console cables under raised floor and through floor and unit cutouts as shown in figure 2-37.
 - ___ d. Connect cables as listed in table 2-15.
- ___ 3. Install end panel on power unit.

Table 2-15. System Console Cable Connections

System Console Rear Connector	IOU/Power Unit Connector	Cable P/N, Length
8	IOU TERMINAL 0 ¹	19268593, 15.2 m (50 ft)
6	IOU TERMINAL 1 ^{1,2}	19268593, 15.2 m (50 ft)
7	Standalone IOU TERMINAL 0 ¹	52537802, 15.2 m (50 ft)
3	Power unit connector J3 ³	67185786, 15.2 m (50 ft)

Notes:

1. Cable ships preconnected to this connector.
2. Do not use TERMINAL 1 on optional standalone IOU.
3. Cable ships with installation kit.

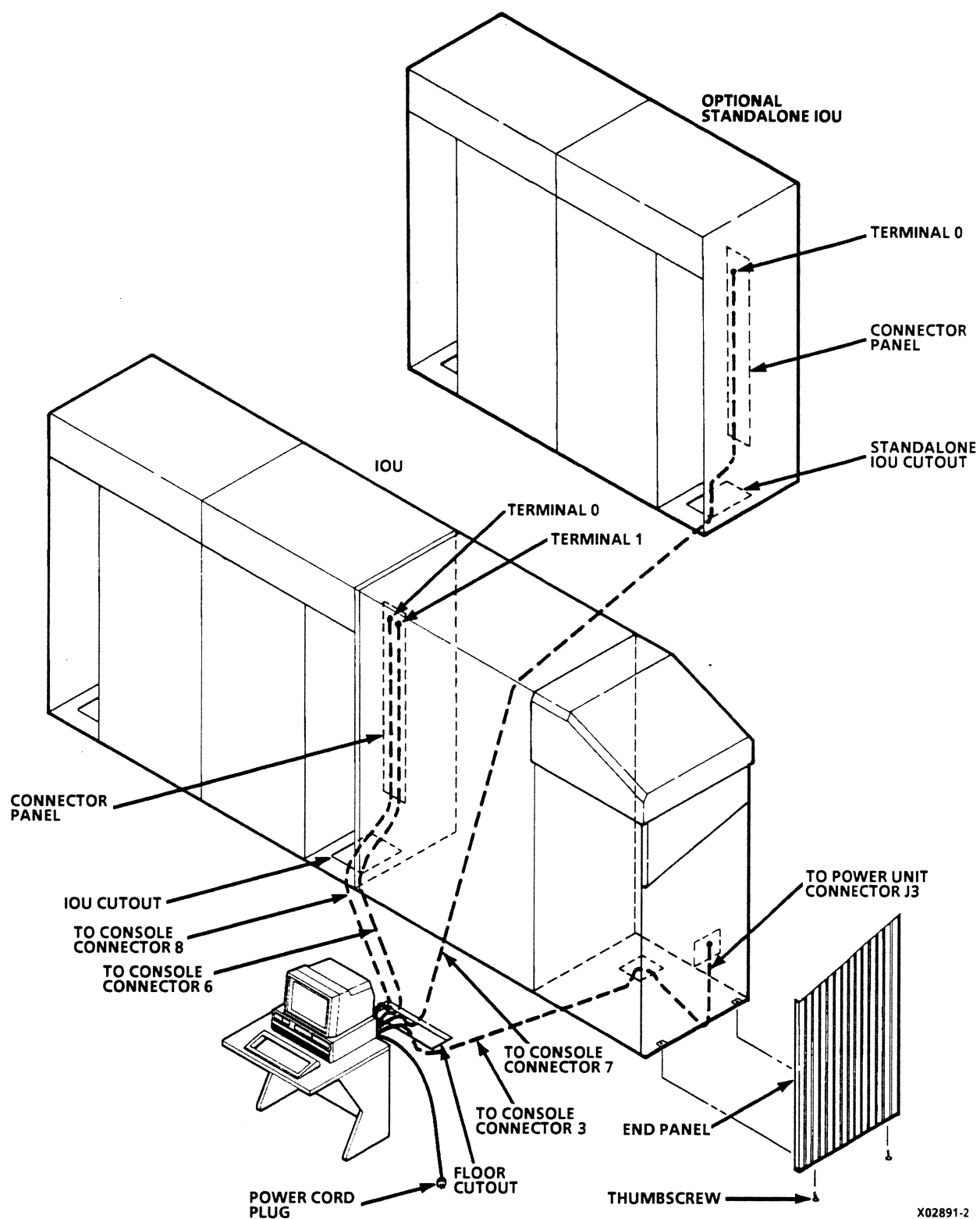


Figure 2-37. System Console Installation

Final IOU Cabling

Use the following procedures to complete the cabling for both primary and standalone IOUs. Perform only those steps that pertain to the particular installation.

Connect SCSI Cables

Use this procedure to connect the SCSI cables between the system console and the primary and standalone IOUs when the primary IOU is an AT511. If the primary IOU is an AT478, go to the next procedure (AT478 does not use SCSI cables).

WARNING

This procedure has been reviewed, but has not been verified. Exercise caution to avoid injury to personnel or damage to equipment.

NOTE

Although the SCSI cable from the system console can logically be connected to either primary or standalone IOU, install as detailed below.

NOTE

Both old and new style channel cable connector panels are shown in this procedure.

- 1. Connect SCSI cable from system console to J05 (old style CHANNEL 32 OUT, new style CHANNEL 32 right side of connector) in primary IOU (figure 2-38).

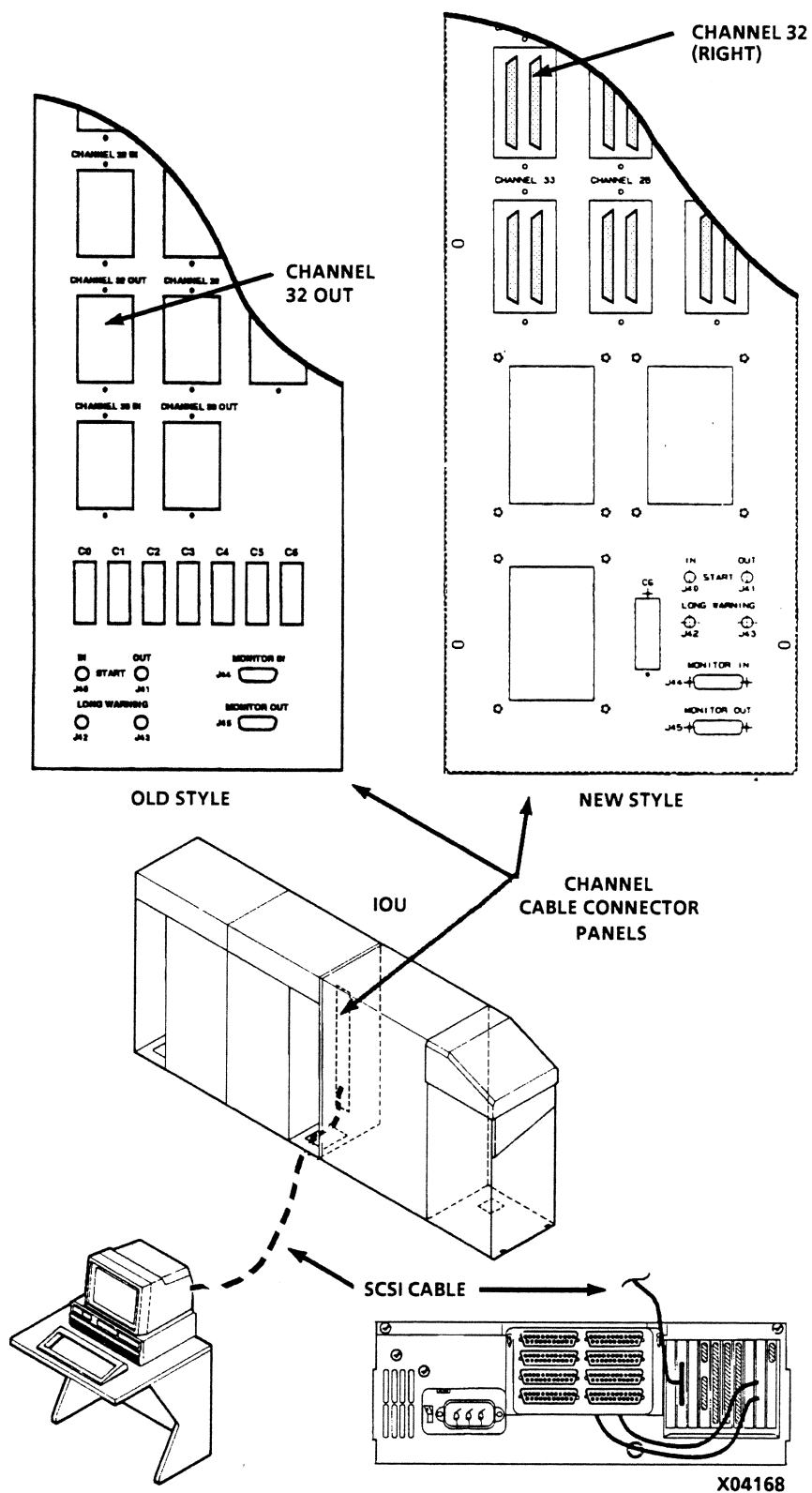
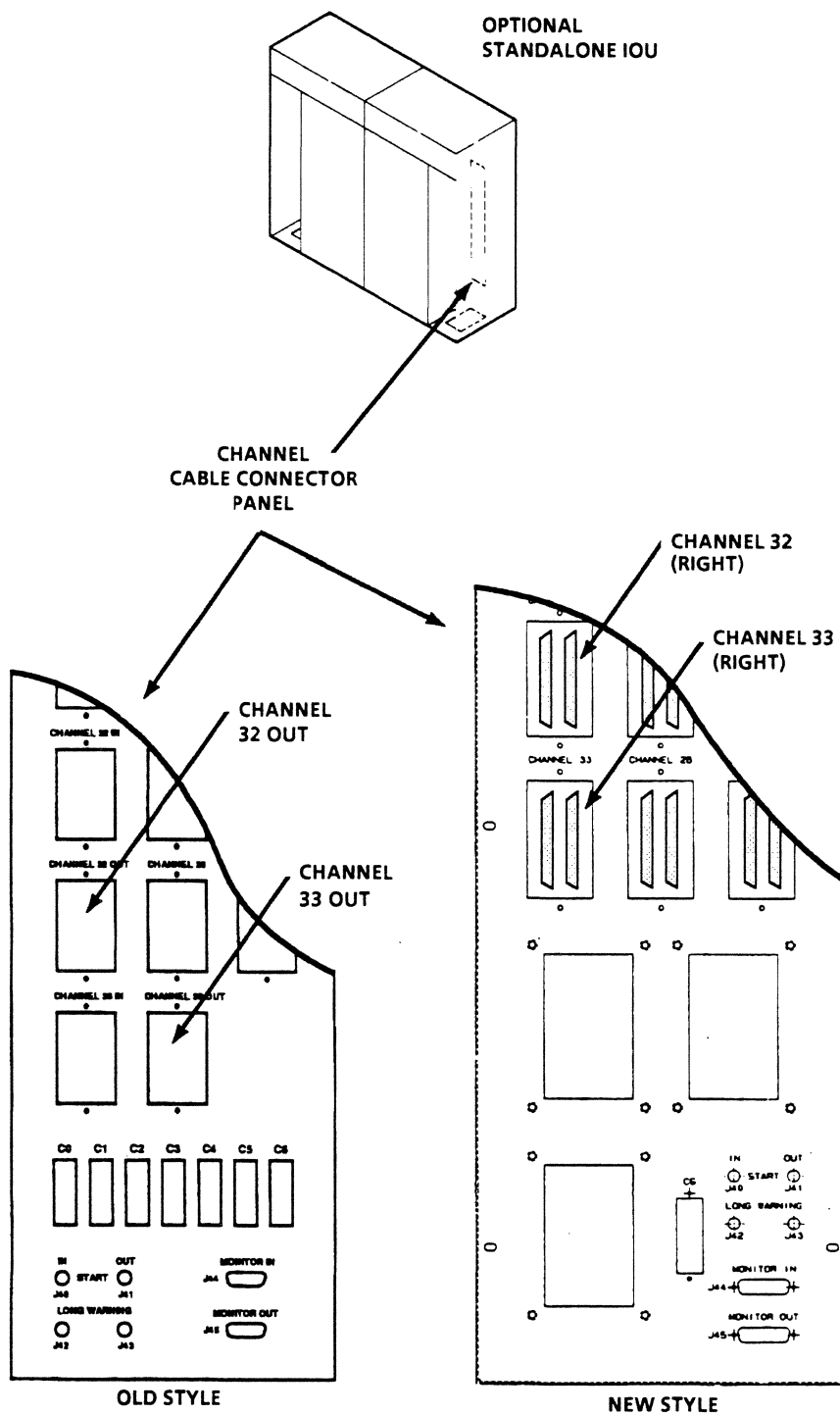


Figure 2-38. SCSI Cable Connections between Console and Primary IOU

- 2. If standalone IOU is being installed, connect SCSI cable from J05 (old style CHANNEL 32 OUT, new style CHANNEL 32 right side of connector) in standalone IOU to J01 (old style CHANNEL 33 OUT, new style CHANNEL 33 right side of connector) in primary IOU (figure 2-39).



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Figure 2-39. SCSI Cable Connections between IOUs

Install Jumper Cables

Use this procedure to install jumper cables in both primary and standalone IOUs. Use this procedure only with an AT511.

NOTE

Jumper cables are only installed in a primary or secondary AT511, not in an AT478.

1. Install jumper cable (figure 2-40) from J08 (old style CHANNEL 32 IN, new style CHANNEL 32 left side of connector) to J02 (old style CHANNEL 33 IN, new style CHANNEL 33 left side of connector) in primary AT511 IOU and in secondary IOU, if present.

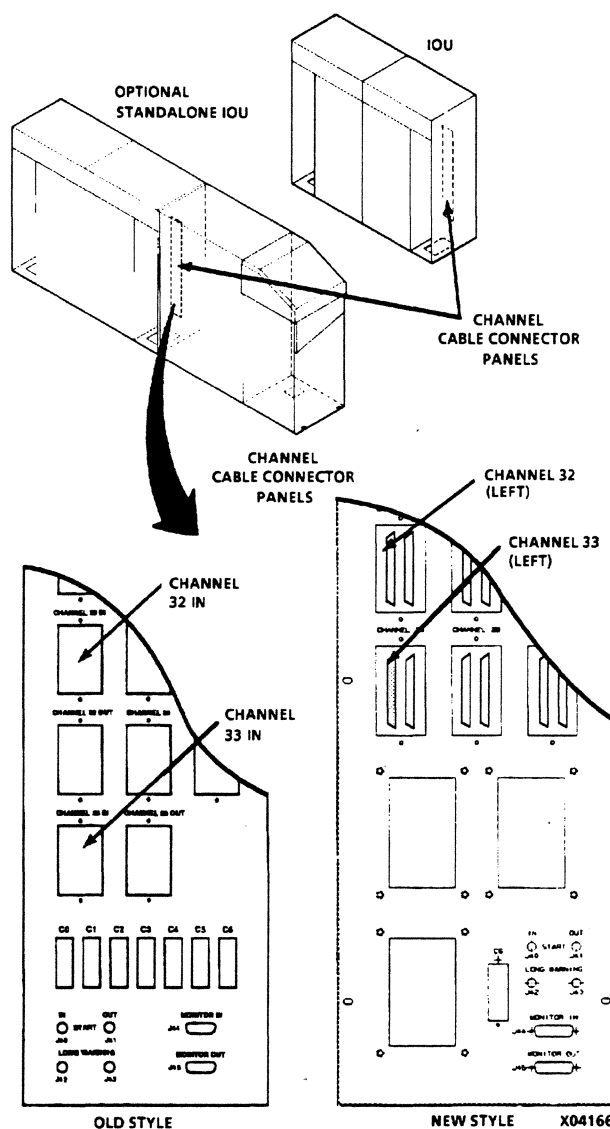


Figure 2-40. Jumper Cable Installation

Install Terminators

Use this procedure to install terminators in primary and standalone IOUs. Install terminators in AT511 IOUs only

1. Install terminators according to the applicable substep(s).
 - a. If standalone IOU is not being installed, connect terminator to J01 (old style CHANNEL 33 OUT, new style CHANNEL 33 right side of connector) in primary IOU (figure 2-41).
 - b. If standalone IOU is being installed, connect terminator to J01 (old style CHANNEL 33 OUT, new style CHANNEL 33 right side of connector) in standalone IOU.
 - c. If primary IOU is an AT478, connect terminators in standalone IOU to both J01 (old style CHANNEL 33 OUT, new style CHANNEL 33 right side of connector) and J05 (old style CHANNEL 32 OUT, new style CHANNEL 32 right side of connector).

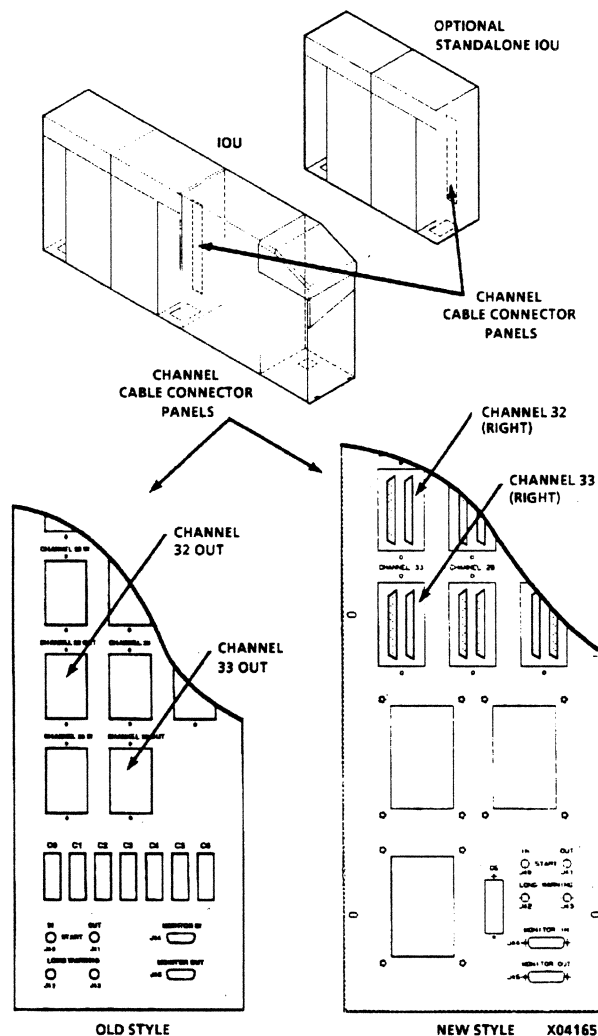


Figure 2-41. Terminator Installation

Set DIP Switches in IOUs

Use this procedure to set DIP switches in primary and standalone (if present) IOUs.

1. If primary only is being installed, set DIP switches (figure 2-42) on 1KLH module in location B04 as follows:
 - a. DIP switch at 14V0, positions 2, and 8 "on" in primary IOU.
 - b. DIP switch at 14F2, positions 1, 2, and 8 "on" in primary IOU.
2. If primary and standalone IOUs are being installed, set DIP switches on 1KLH module in location B04 as follows:
 - a. DIP switch at 14V0, positions 1, 2, and 8 "on" in primary IOU.
 - b. DIP switch at 14F2, positions 1, 3, and 8 "on" in primary IOU.
 - c. DIP switch at 14V0, positions 2 and 8 "on" in standalone IOU.
 - d. DIP switch at 14F2, positions 3 and 8 "on" in standalone IOU.

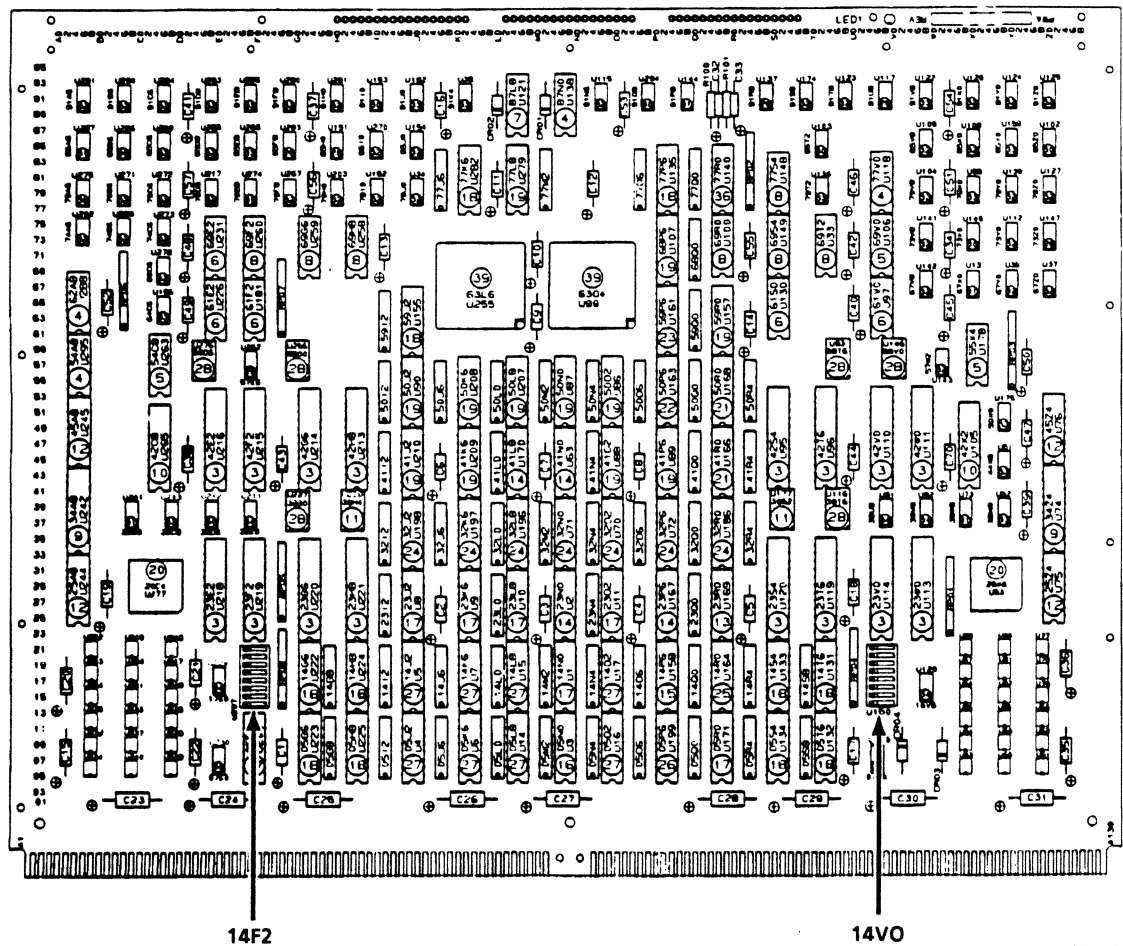


Figure 2-42. 1KLH Module and DIP Switch Location

Checking Prepower Conditions

The following procedures check connections to ensure that unit blowers operate at the available 50/60-Hz site voltage. The procedures also specify control switch and power switch positions prior to the connection of power wiring to the units.

- Check Power Unit 50/60-Hz Cable Connectors
- Check Power Unit Power Label
- Check IOU Blower Transformer Voltage Taps
- Check IOU Multiplexer Board Switches
- Install CP Regulator Pak and Logic Modules
- Check Seating of IOU Logic Modules
- Set Circuit Breakers and Controls

Check Power Unit 50/60-Hz Cable Connectors

Use this procedure to check that cable connections adapt the power unit blowers and power supply to the site 50/60-Hz voltage and to change the cable connections, if necessary.

- ___ 1. Be sure that 50/60-Hz power is not applied to power unit.
- ___ 2. Be sure to correctly identify site 50/60-Hz voltage to be provided to power unit. Check voltage notations on site power receptacles and circuit breaker panels and through customer.
- ___ 3. Check and change power unit connectors P1 through P4 as required to match site voltage:
 - ___ a. For 50-Hz voltage, connectors must be as shown in figure 2-43.
 - ___ b. For 60-Hz voltage, connectors must be as shown in figure 2-44.

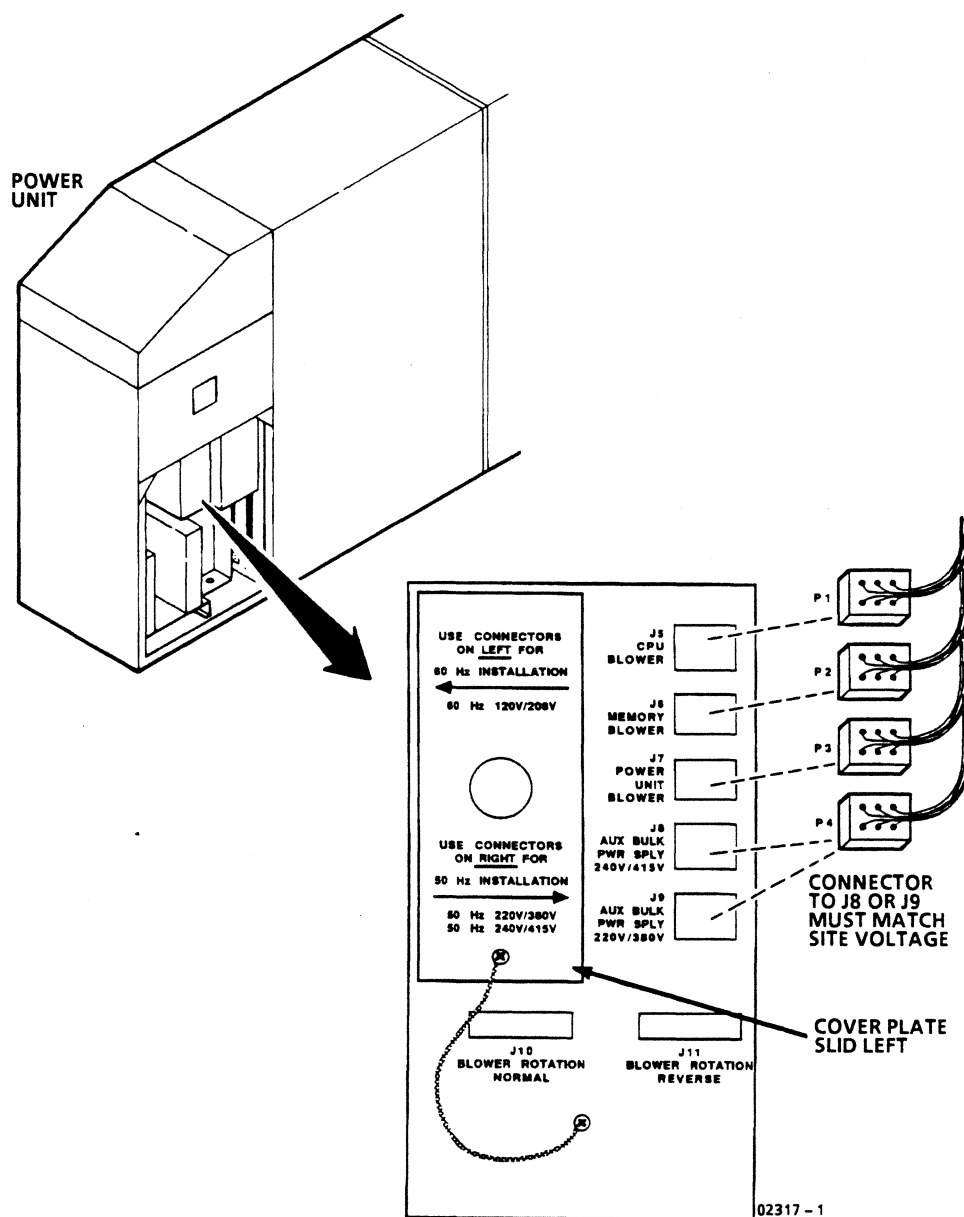


Figure 2-43. Power Unit 50-Hz Cable Connections

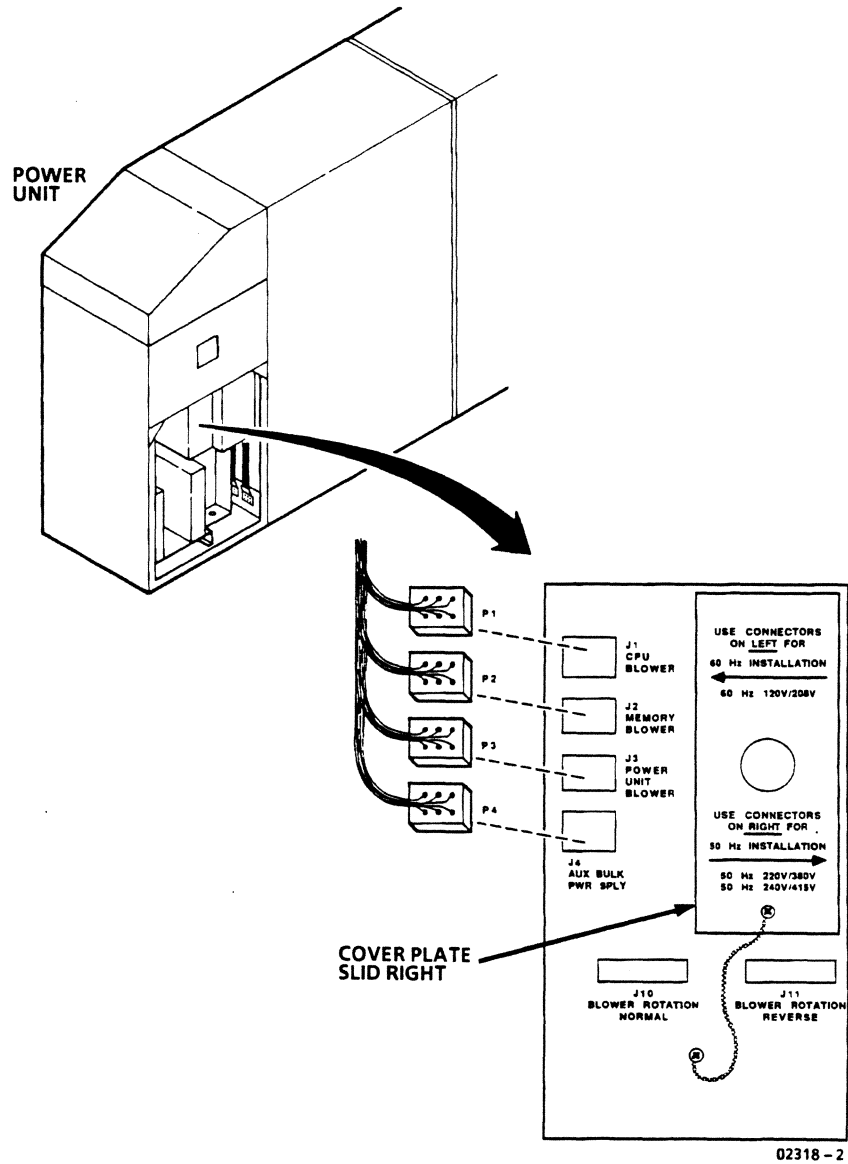


Figure 2-44. Power Unit 60-Hz Cable Connections

Check Power Unit Power Label

Use this procedure to check the power unit power label for correct site voltages.

- ___ 1. Check power label (figure 2-45) for correct identification of unit voltages. If label is correct, go to next procedure. If label is incorrect:
 - ___ a. Cross out voltages on power label with permanent marker.
 - ___ b. Order new label (P/N 18989236) through site parts ordering process.
 - ___ c. Mark new label with current voltages.
 - ___ d. Replace old label with new label.

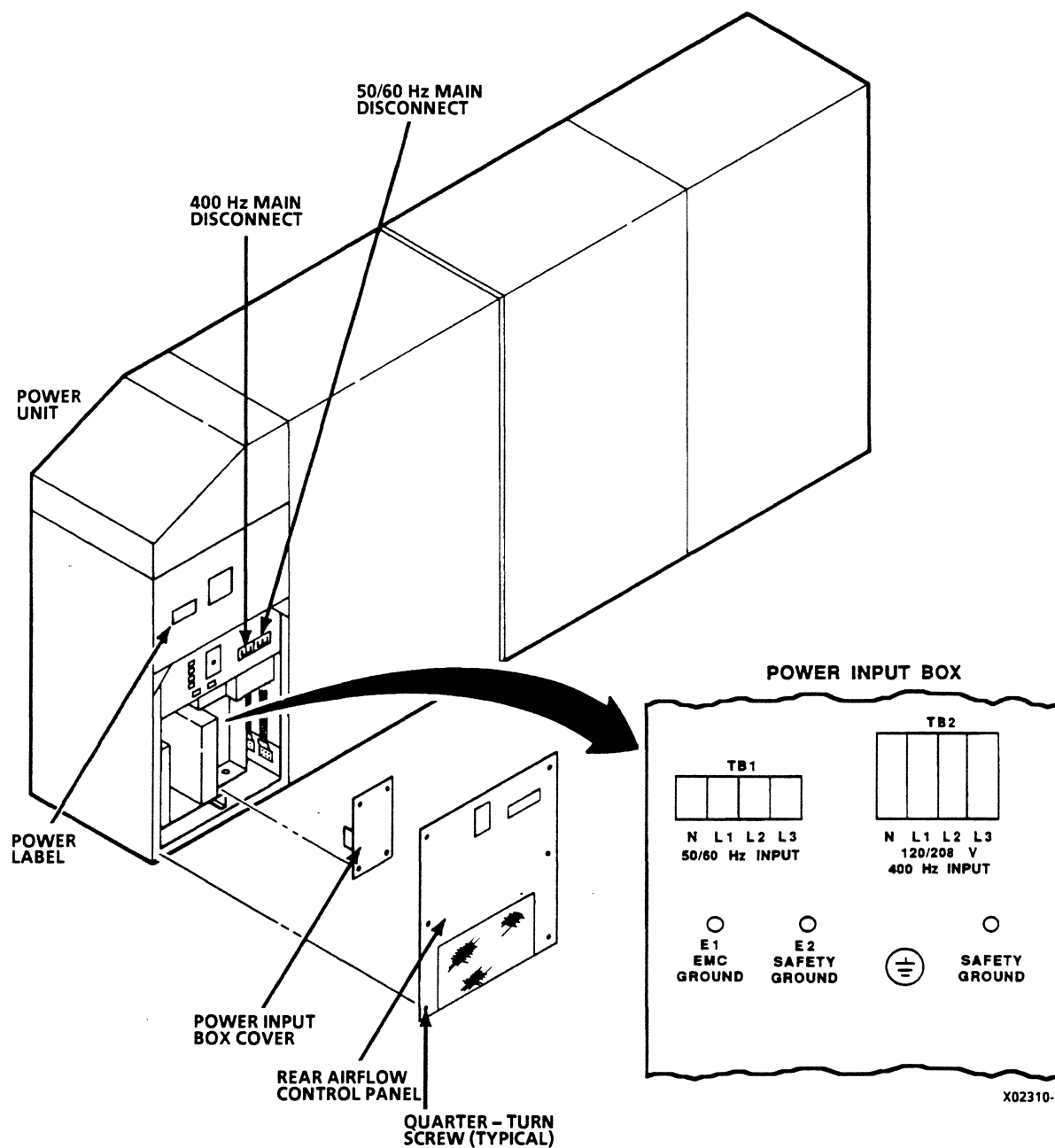


Figure 2-45. Power Label Location

Check IOU Blower Transformer Voltage Taps

Use this procedure to check that transformer tap connections in the IOU and optional IOUs are correct for the site voltage.

- ___ 1. Read power identification label, located on bottom of IOU in front of cable cutout. Label identifies IOU power requirements:
 - ___ a. If label requirements match 50/60-Hz site power, go to next procedure.
 - ___ b. If label requirements differ from site 50/60-Hz power, perform remaining steps.
- ___ 2. Make sure that 50/60-Hz power is not applied to IOU.
- ___ 3. Access blower transformer terminal strip T5 at rear of power distribution box as shown in figure 2-46.
- ___ 4. Move single wire labeled RECONNECTABLE from 120V, 220V, 230V, 240V, or 250V terminal on T5 strip to terminal that matches site voltage.
- ___ 5. Install removed covers and fasten power distribution box in IOU with retaining screw.
- ___ 6. Repeat this procedure for:
 - ___ a. Optional IOU expansion.
 - ___ b. Optional standalone IOU.
 - ___ c. Optional standalone IOU expansion.

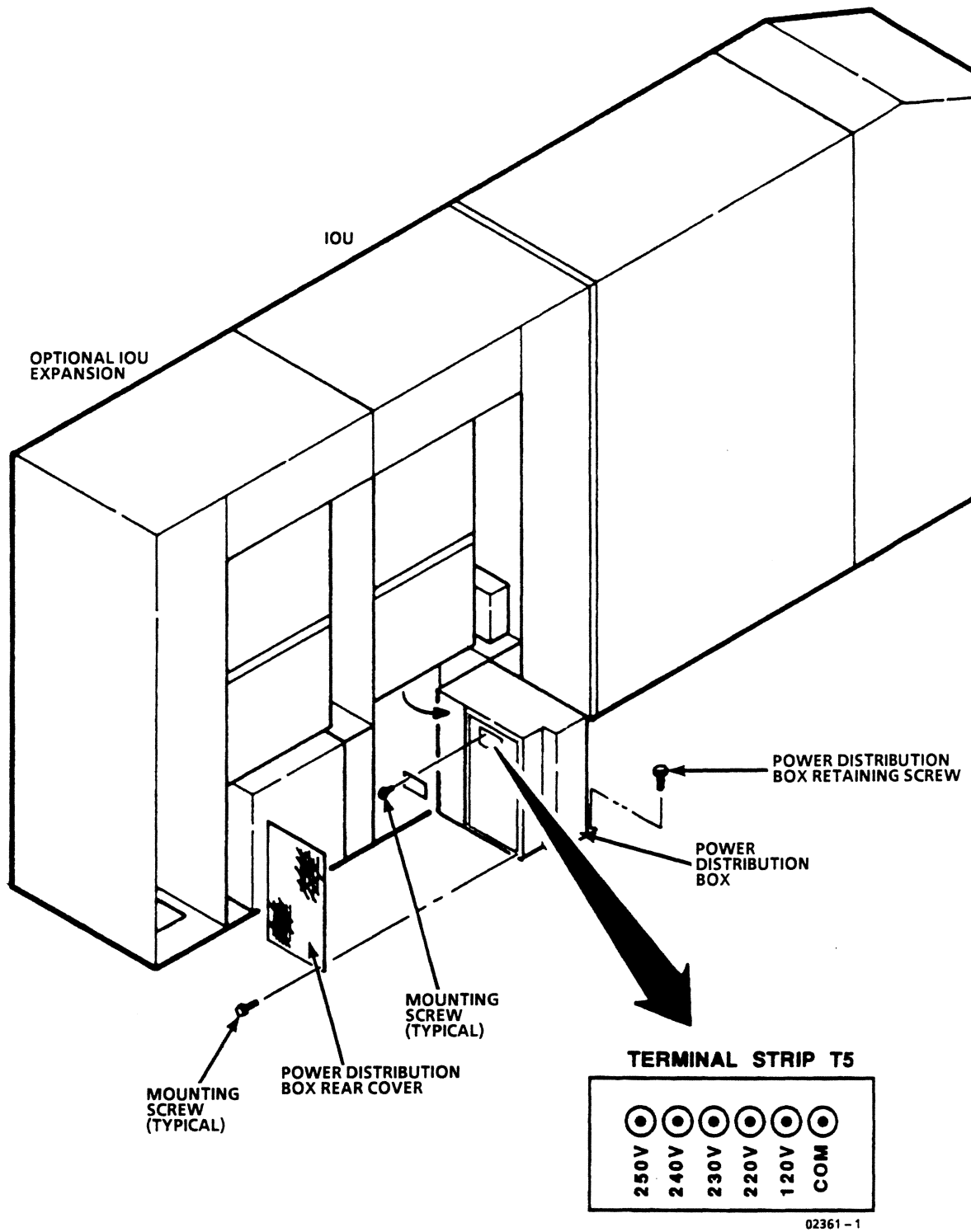


Figure 2-46. IOU Blower Transformer Voltage Taps

Check IOU Multiplexer Board Switches

Use this procedure to check that the multiplexer (mux) board switches in each IOU are set to the correct multiplexer address (adrs).

- ___ 1. Access multiplexer board from rear of IOU or optional IOUs (figure 2-47).
- ___ 2. Check and set switch SW1 on each multiplexer board as listed in table 2-16.

Table 2-16. IOU Multiplexer Board Switch Positions

Switch Location	Switch Numbers	Switch Positions
IOU (Multiplexer Address 1)	1	Away from number 1
	2	Toward number 2
	3	Toward number 3
	4	Toward number 4
Optional IOU Expansion (Multiplexer Address 2)	1	Toward number 1
	2	Away from number 2
	3	Toward number 3
	4	Toward number 4
Optional Standalone IOU (Multiplexer Address 3)	1	Away from number 1
	2	Away from number 2
	3	Toward number 3
	4	Toward number 4
Optional Sandalone IOU Expansion (Multiplexer Address 4)	1	Toward number 1
	2	Toward number 2
	3	Away from number 3
	4	Toward number 4

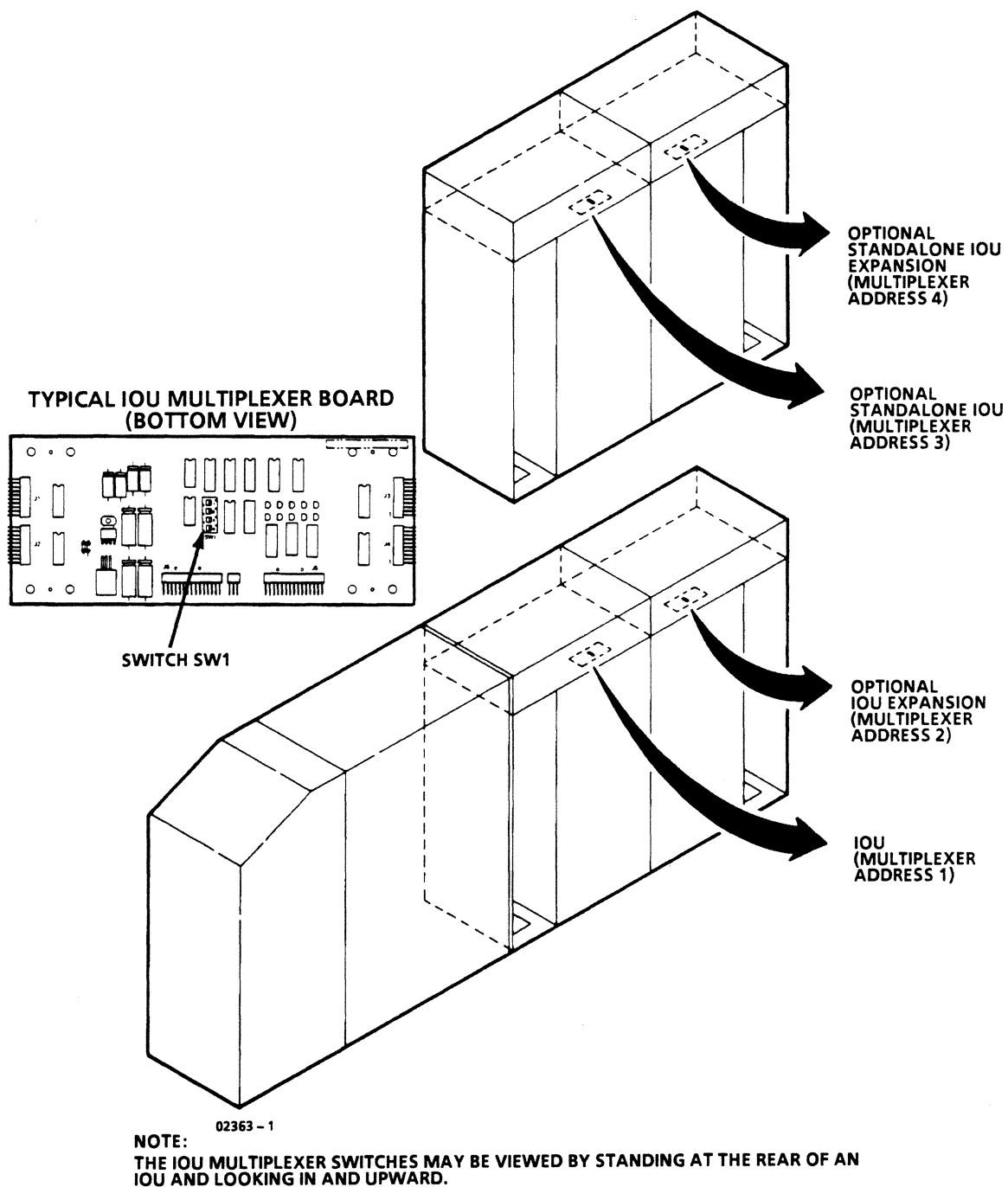


Figure 2-47. IOU Multiplexer Board Switches

Install CP Regulator Pak and Logic Modules

Use the following procedures to install the CP Regulator Pak and logic modules. The Pak and modules are shipped in a separate container, and are not shipped installed in the CP.

Install CP Regulator Pak

Use this procedure to install the CP Regulator Pak(s).

CAUTION

Antistatic measures must be followed during the installation of the CP regulator pak to prevent damage to the pak by electrostatic discharges.

- ___ 1. Wear antistatic smock.
- ___ 2. Attach antistatic wrist strap to wrist and frame ground.
- ___ 3. Remove Regulator Pak from antistatic bag.

CAUTION

When pushing Pak into CP, make sure it doesn't catch on and cut SIB cables.

- ___ 4. Place Pak on channel guide (figure 2-48) at bottom of CP-0 logic cage. Slide Pak into cage, through a springy resistance, until it seats in rear connectors.
- ___ 5. Install Regulator Pak retaining screw(s).
- ___ 6. Connect J1 and J3 to front of Regulator Pak.
- ___ 7. Repeat this procedure for CP-1 (if present).

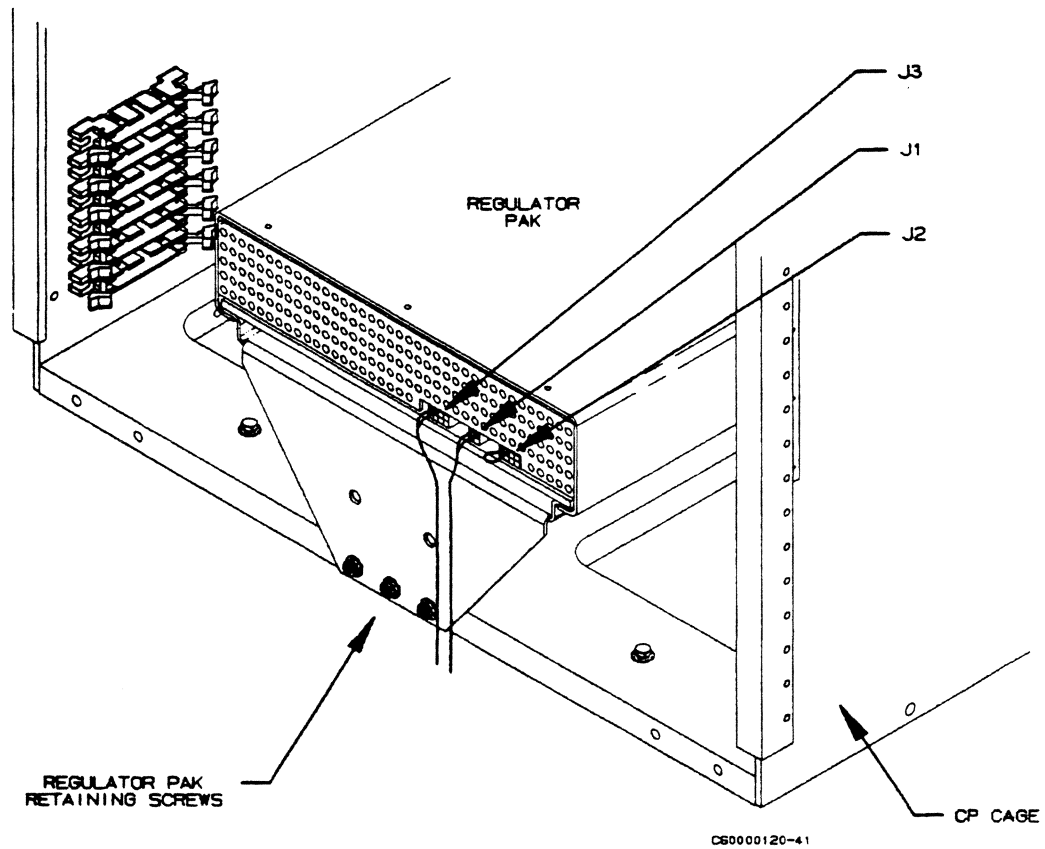


Figure 2-48. CP Regulator Pak

Install CP Modules

Use this procedure to install logic modules in CP-0 and optional CP-1 (if present).

- ___ 1. Locate special module tools in installation kit:

- Pin alignment gauge
- Pin straightener
- Quick release

⚠ CAUTION

Antistatic measures must be followed during the installation of the CP logic modules to prevent damage to the modules by electrostatic discharges.

- ___ 2. Wear antistatic smock.

- ___ 3. Attach antistatic wrist strap to wrist and frame ground.

⚠ CAUTION

Use only the quick release intended for the cams. Other quick releases or devices will cause damage.

- ___ 4. Pull out all cams from cage, using quick release. Cams must be pulled out far enough so Board Interlocks automatically rotate into cams and lock cams in fully extended position.

⚠ CAUTION

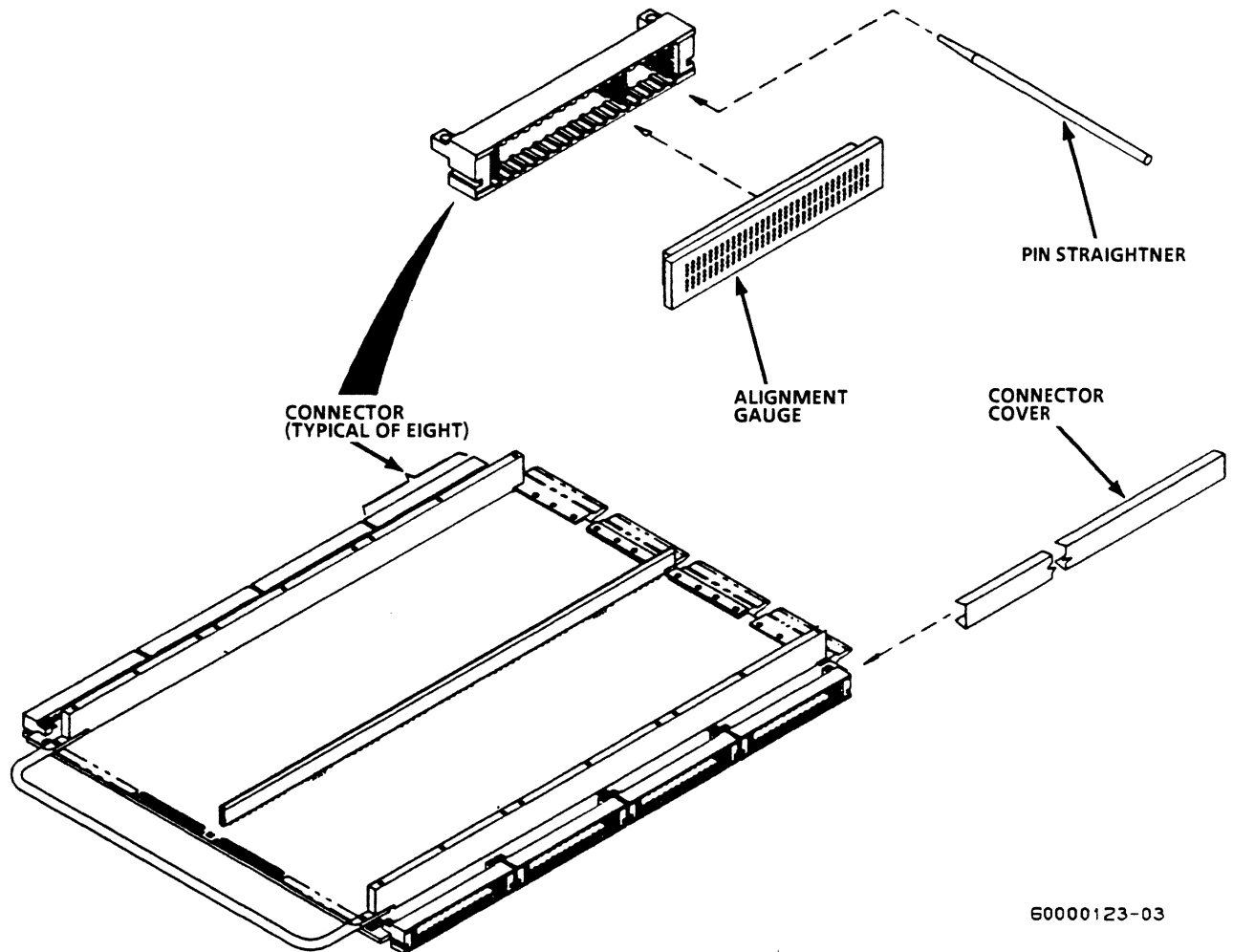
Hold modules by the front handle and the back power connectors. Do not hold modules by the eight side connectors.

Inspect modules for condensation after removing them from their packaging material. Modules should not be installed if they are cold and/or damp.

- ___ 5. Remove CMCA logic module from shipping container.

- ___ 6. Remove CMCA module from antistatic bag. Lay bag on flat surface (table or floor) and lay module on bag.

- 7. Remove connector covers from module (figure 2-49).
- 8. Check for bent or broken connector pins by placing alignment gauge over pins. Use pin straightener to straighten pins as necessary.



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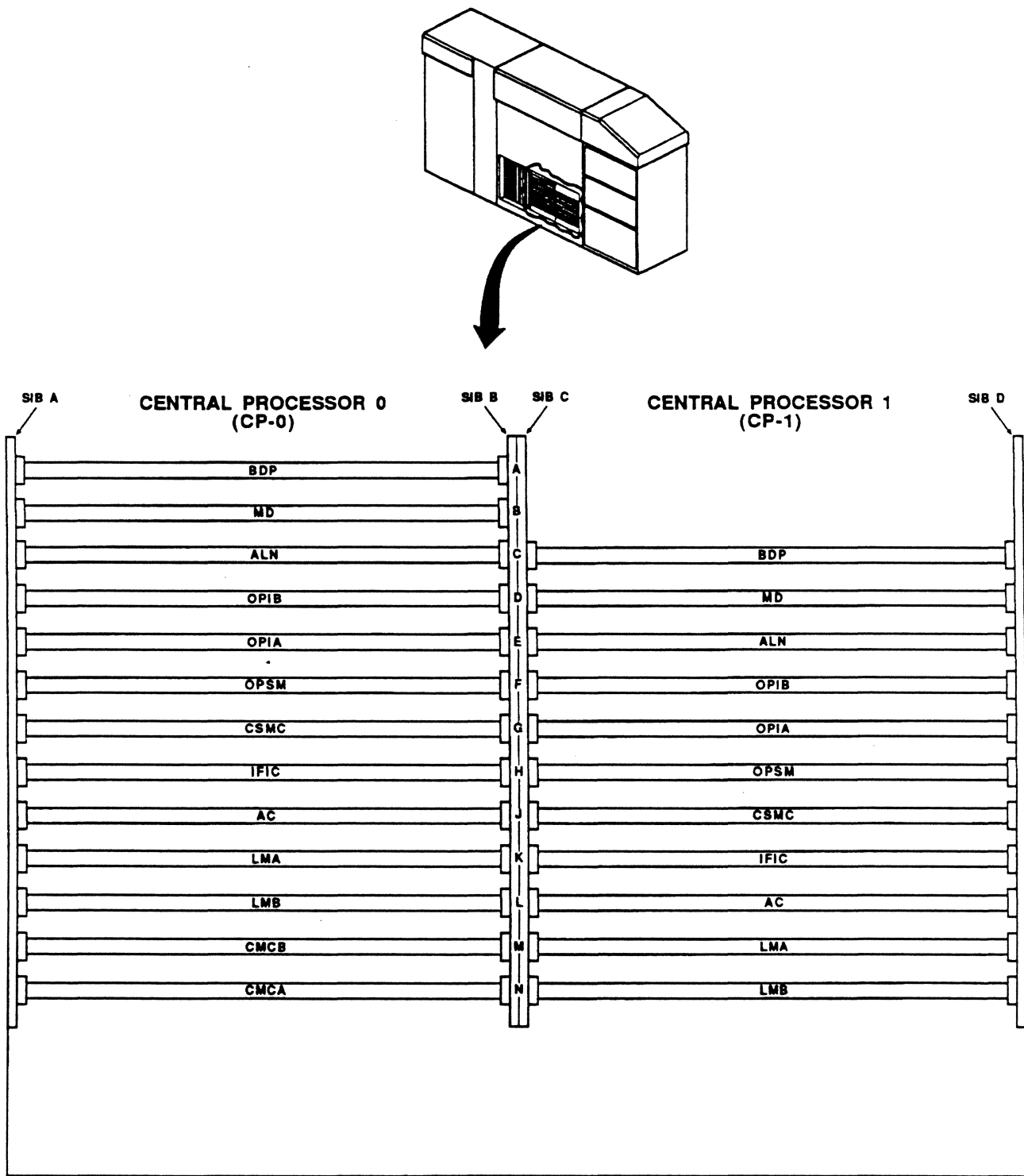
Figure 2-49. Logic Module and Pin Alignment Gauge

- ___ 9. Locate associated module slot in CP cage (figure 2-50) and check that quick release is not in either cam.
- ___ 10. Center edge of module in slot.

 CAUTION

When pushing module into its slot, observe the underside of the module to be sure that any wires on the underside do not catch on anything below.

- ___ 11. Push module slowly into slot, through a springy resistance, until module seats in rear connectors with an audible thud.



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Figure 2-50. CP Logic Module Locations

- ___ 12. Rotate board interlock out of left cam bracket (figure 2-51) and momentarily hold interlock while pushing cam fully into cage.

⚠ CAUTION

Do not force cam in. If cam binds or does not move relatively freely, pull cam out, and push in again.

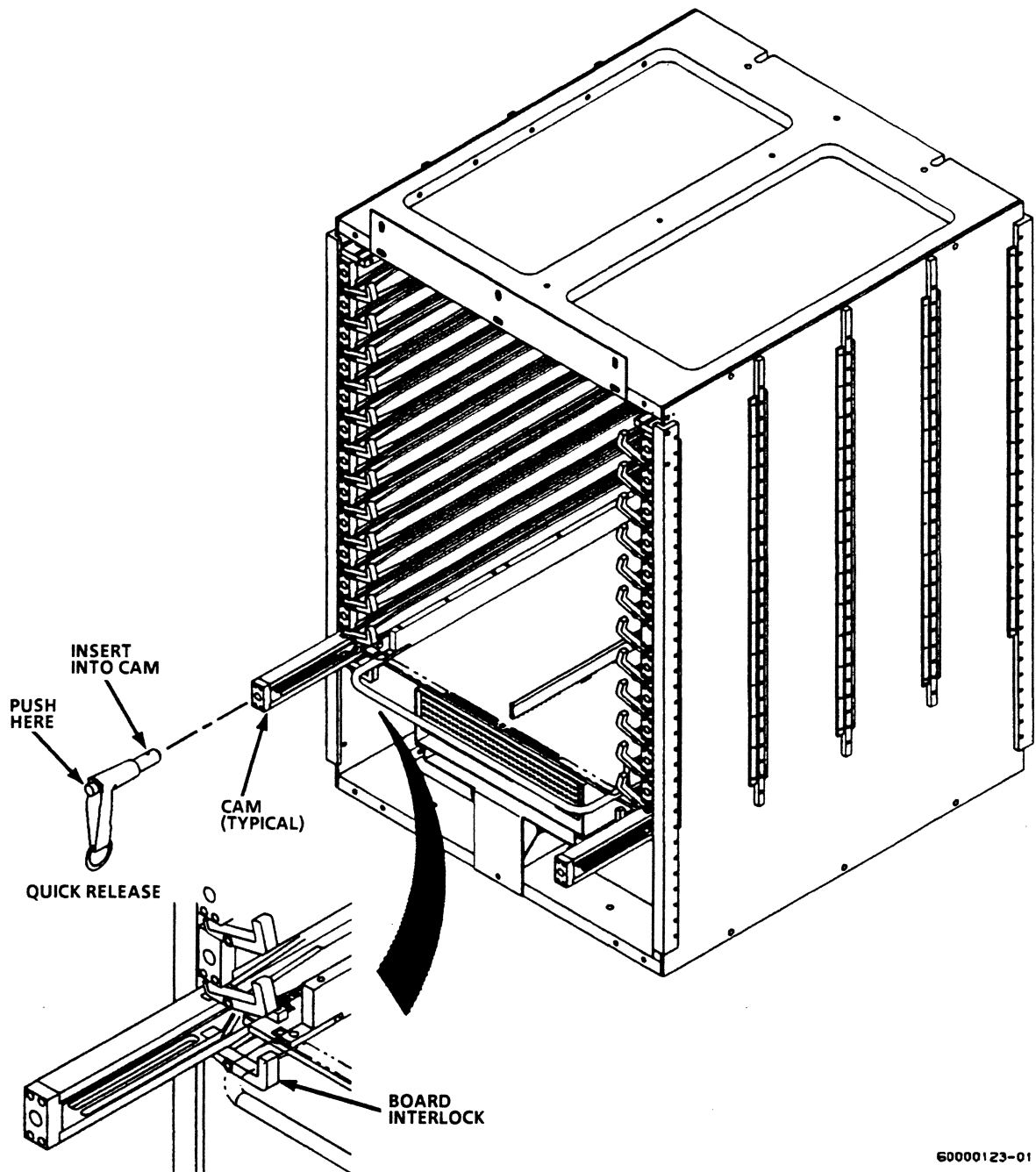
If cam still binds, fully pull out both cams, remove module, check for and correct any bent or broken pins, reseal module, and push cams in again.

- ___ 13. Rotate board interlock out of right cam bracket and momentarily hold interlock while pushing cam fully into cage.
- ___ 14. Install remaining CP-0 modules in same manner as CMCA module, working from bottom to top of cage as follows.

- | | | |
|--------------|----|------|
| <u> x </u> | a. | CMCA |
| ___ | b. | CMCB |
| ___ | c. | LMB |
| ___ | d. | LMA |
| ___ | e. | AC |
| ___ | f. | IFIC |
| ___ | g. | CSMC |
| ___ | h. | OPSM |
| ___ | i. | OPIA |
| ___ | j. | OPIB |
| ___ | k. | ALN |
| ___ | l. | MD |
| ___ | m. | BDP |

- ___ 15. Install CP-1 modules in same manner as CMCA module, working from bottom to top of cage as follows.

- | | | |
|-----|----|------|
| ___ | a. | LMB |
| ___ | b. | LMA |
| ___ | c. | AC |
| ___ | d. | IFIC |
| ___ | e. | CSMC |
| ___ | f. | OPSM |
| ___ | g. | OPIA |
| ___ | h. | OPIB |
| ___ | i. | ALN |
| ___ | j. | MD |
| ___ | k. | BDP |



60000123-01

Figure 2-51. CP Cage Details

NOTE

If Remote IOU is not present, skip to the next procedure.

- ___ 16. Locate Remote IOU Interface Module.
- ___ 17. Hold Remote IOU Interface Module upright (vertically) and plug in SIB cables. Use decal on front of CP as a guide (figure 2-52).
- ___ 18. Carefully slide Remote IOU Interface Module into bottom slot of CP-1 or into Remote IOU Interface Module mounting box, pushing SIB cables into CP base as module is being inserted.
- ___ 19. Insert retaining screws into Remote IOU Interface Module.

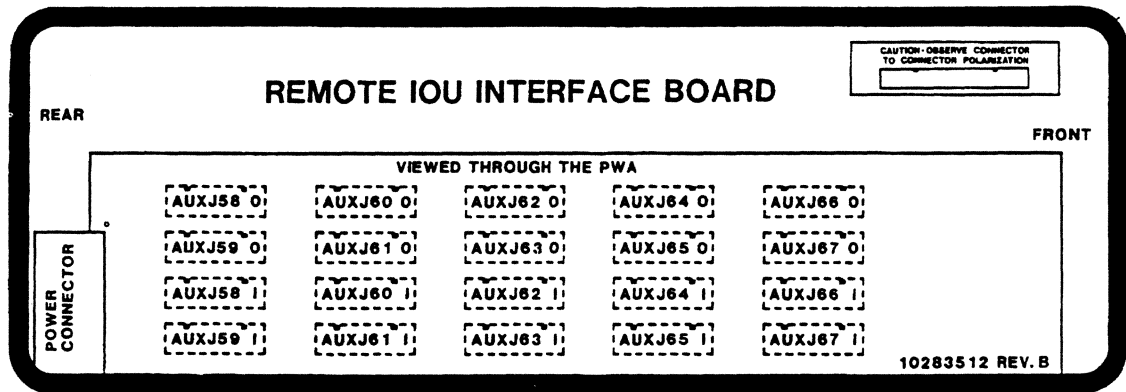


Figure 2-52. Remote IOU Interface Module Cabling

Check Seating of IOU Logic Modules

Use this procedure to check that all IOU logic modules fully seat in their connectors.

- ___ 1. Be sure that power is not applied to logic modules.
- ___ 2. Remove front covers from IOU upper and lower logic cages by lifting covers up and away from cages.

⚠ CAUTION

Each IOU module must be checked to prevent the possibility of damage to the connector contacts during the application of logic power.

NOTE

Older versions of pak insertions tool differ from the one shown, but will work.

- ___ 3. Place pak insertion tool on top and bottom channels across front of logic cage (figure 2-53).
- ___ 4. Slide tool on channels so it aligns with a module.
- ___ 5. Move tool handle downward with enough pressure to press module inward and assure that it is firmly seated in rear connectors.
- ___ 6. Repeat this check for each module in upper and lower IOU logic cages.
- ___ 7. Replace front covers on logic cages.
- ___ 8. Repeat procedure for:
 - ___ a. Optional IOU expansion.
 - ___ b. Optional standalone IOU.
 - ___ c. Optional standalone IOU expansion.

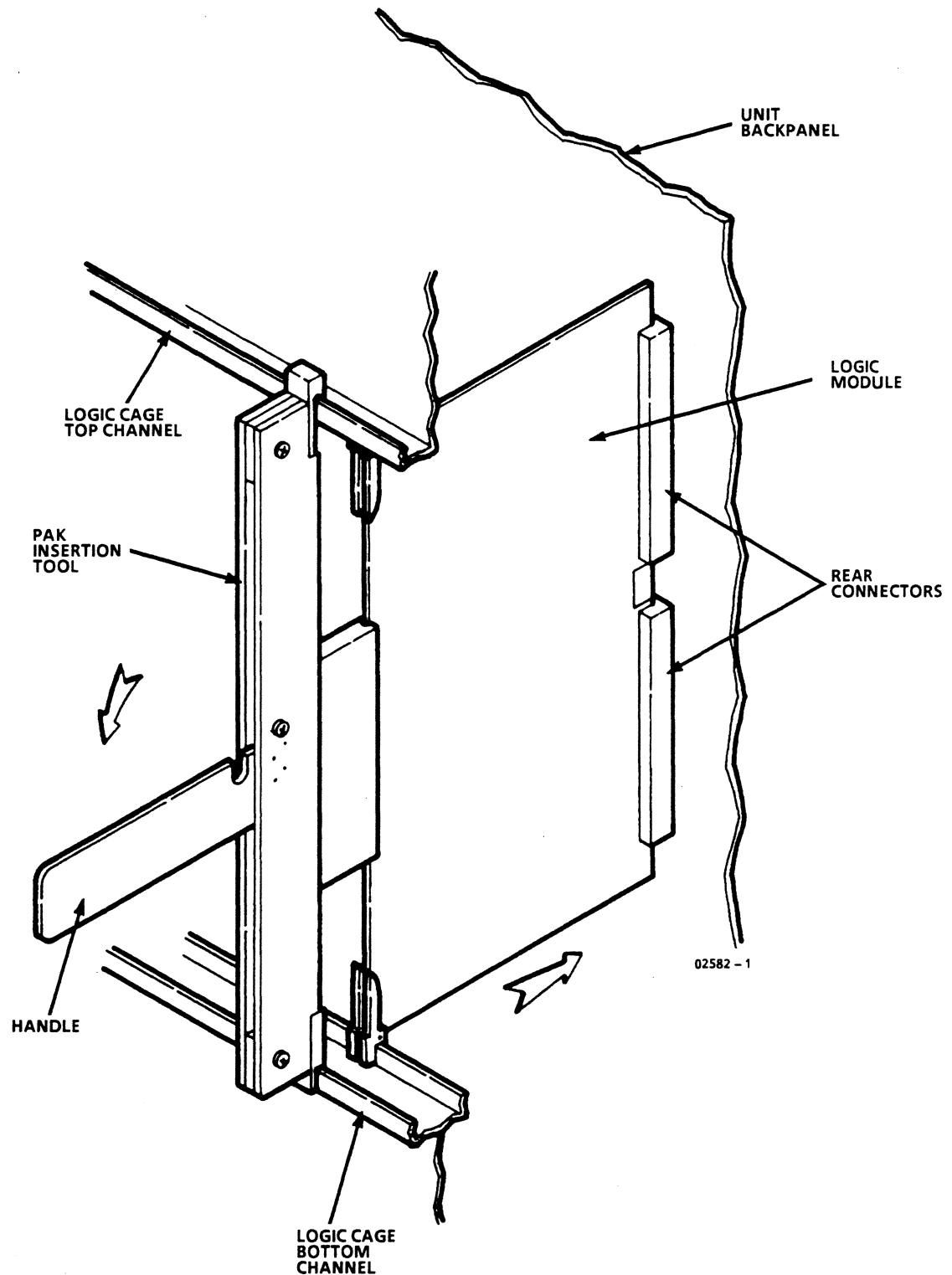
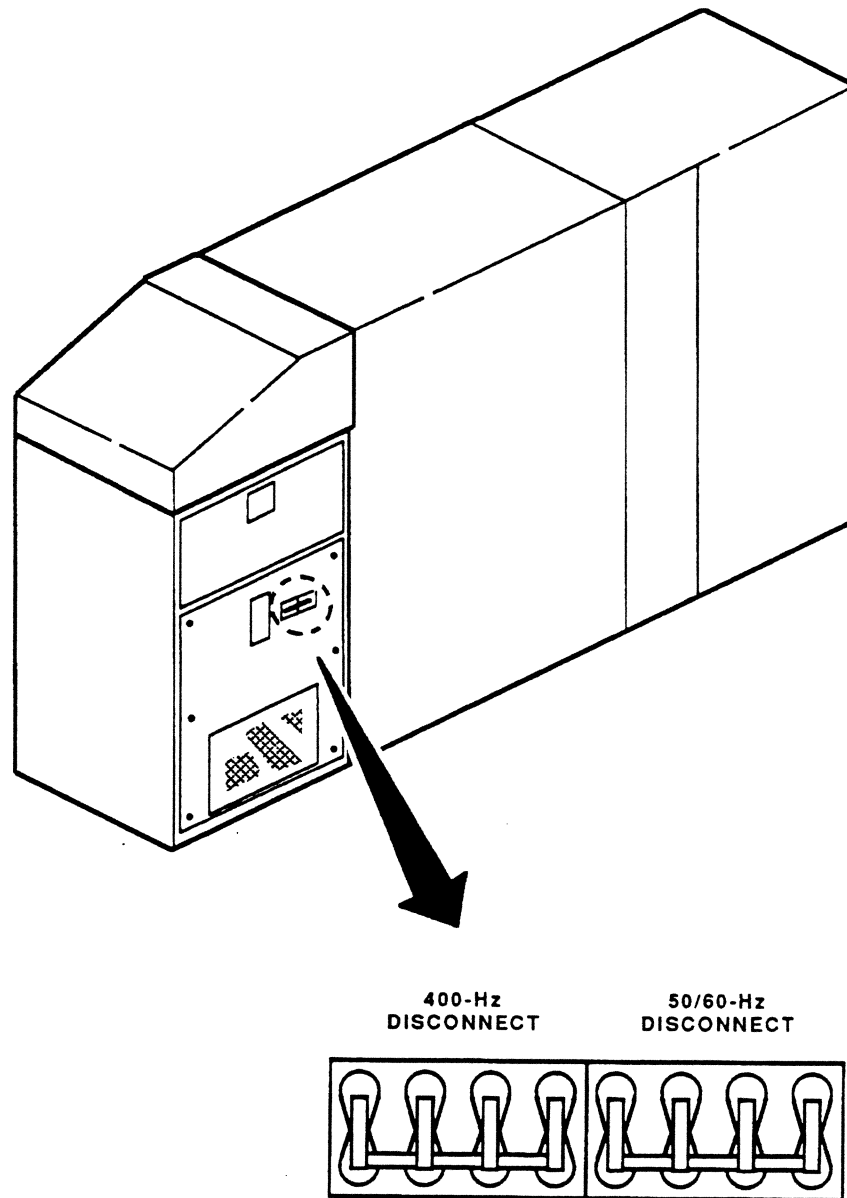


Figure 2-53. IOU Logic Module Insertion Check

Set Circuit Breakers and Controls

Use this procedure to set CPU and IOU circuit breakers and controls to proper positions before initially turning on power.

- ☐ 1. Be sure that:
 - ☐ a. Previous procedures are completed.
 - ☐ b. Site 50/60-Hz circuit breakers to MG set and MG interface unit are off.
 - ☐ c. Site 50/60-Hz circuit breakers to mainframe units are off.
 - ☐ d. Site 400-Hz circuit breakers to mainframe units are off.
- ☐ 2. Set power unit circuit breakers and controls at rear of power unit (figure 2-54) as follows:
 - ☐ a. 50/60 Hz DISCONNECT to 0 (OFF).
 - ☐ b. 400 Hz DISCONNECT to 0 (OFF).



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Figure 2-54. Power Unit Rear Controls

- ___ 3. Set circuit breakers and controls at front of power unit (figure 2-55) as follows:
 - ___ a. Insert key (ships with power unit) in keyswitch on main control panel.
Set switch to LOCAL MODE.
 - ___ b. NORMAL/DISABLE switch on main control panel to DISABLE.
 - ___ c. 120V 50/60 Hz CONTROL on AUX. BULK POWER SUPPLY to off
(down).
 - ___ d. -2.0V POWER SUPPLY DISCONNECT to OFF.
 - ___ e. -2.0-V power supply ADJUST to fully ccw position.
 - ___ f. -4.5V POWER SUPPLY DISCONNECT to OFF.
 - ___ g. -4.5-V power supply ADJUST to fully ccw position.
 - ___ h. +5.0V POWER SUPPLY DISCONNECT to OFF.
 - ___ i. +5.0-V power supply ADJUST to fully ccw position.

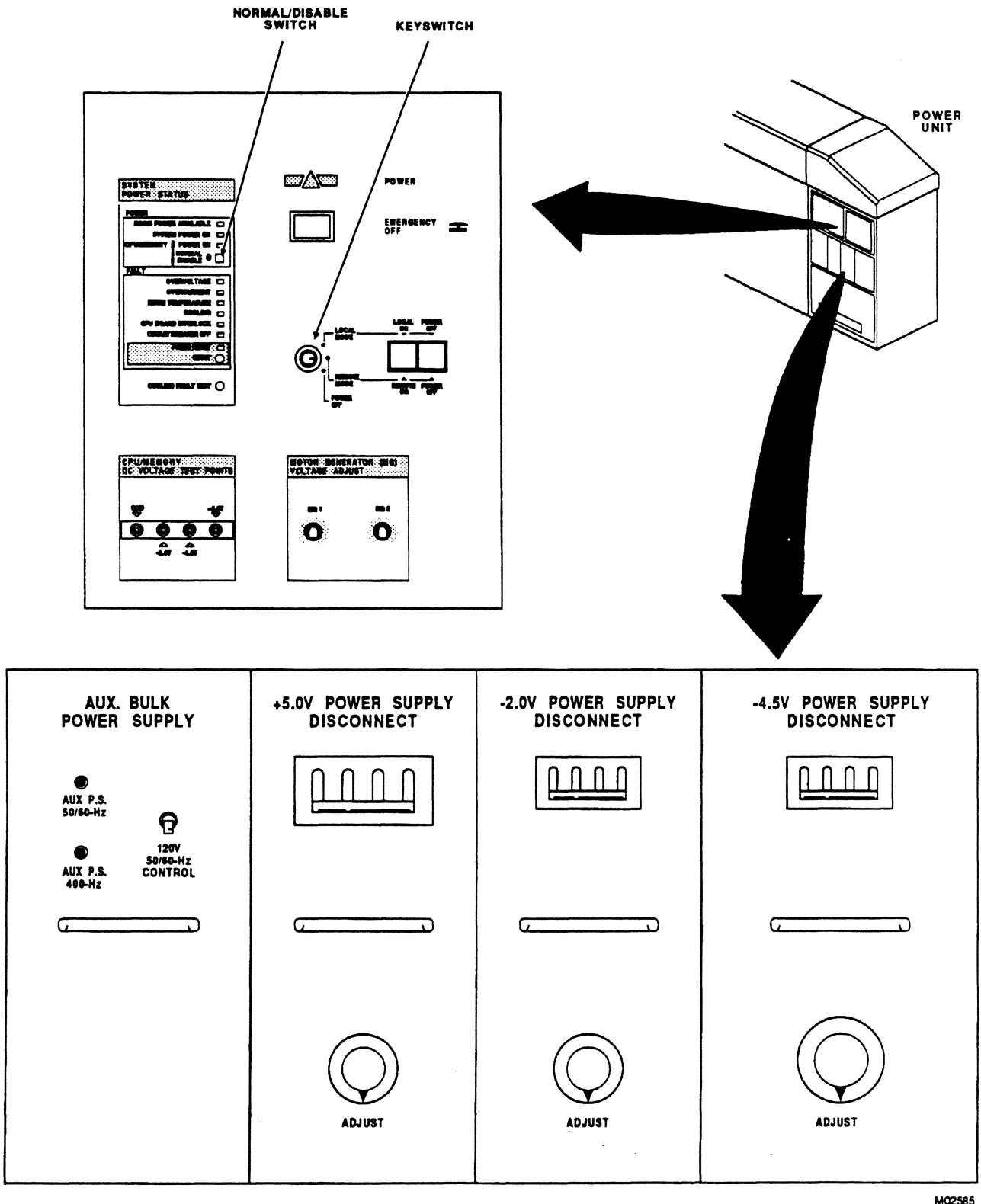


Figure 2-55. Power Unit Front Controls

- ___ 4. Set IOU circuit breakers and controls (figure 2-56) as follows:
 - ___ a. MAIN DISCONNECT to 0 (OFF).
 - ___ b. 50/60 Hz DISCONNECT to 0 (OFF).
 - ___ c. V1 DISCONNECT to 0 (OFF).
 - ___ d. V1 ADJUST to fully ccw position.
 - ___ e. V2 DISCONNECT to 0 (OFF).
 - ___ f. V2 ADJUST to fully ccw position.
 - ___ g. V3 DISCONNECT to 0 (OFF), if present.
 - ___ h. V3 ADJUST to fully ccw position, if present.
 - ___ i. Mode switch on top of power distribution box to LOC (local).
 - ___ j. MUX POWER DISCONNECT to 0 (OFF). (IOU and optional standalone IOU only.)
- ___ 5. Repeat step 4 for each optional IOU present.
 - ___ a. Optional IOU expansion.
 - ___ b. Optional standalone IOU.
 - ___ c. Optional standalone IOU expansion.
- ___ 6. Set IOU switches (AT478-A/B 960 only) as follows:
 - ___ a. BAUD RATE SELECTION PORT 0 switch to 19.2K.
 - ___ b. BAUD RATE SELECTION PORT 1 switch to 19.2K.
 - ___ c. PORT OPTIONS PORT 0 keyswitch to DS & PWR ENABLE.
 - ___ d. PORT OPTIONS PORT 1 keyswitch to DS & PWR ENABLE.

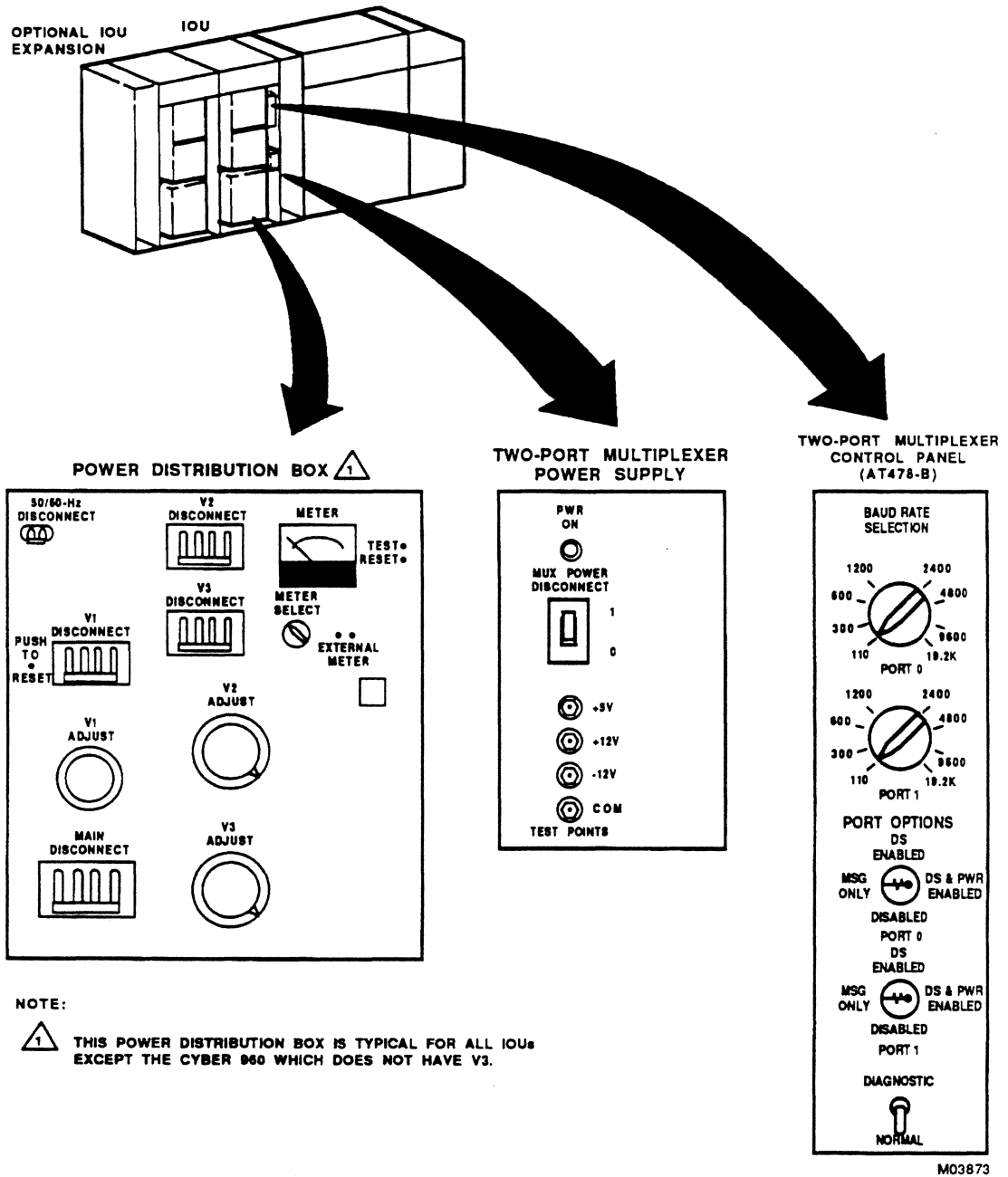


Figure 2-56. IOU Controls

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Connecting Site Power Wiring

The following procedures describe 50/60- and 400-Hz power wiring connections to the IOU, optional IOUs, and power unit.

- Connect Site 50/60- and 400-Hz Power Wiring to IOUs
- Connect Site 50/60- and 400-Hz Power Wiring to Power Unit

NOTE

Connections from an under-floor ground reference grid to EMC GND terminals in the following procedures are unnecessary with the normally-used shielded signal cables that go to and from the central computer. For additional information on EMC grounding, refer to EMC Grounding in Chapter 4 of the the Site Preparation General Information manual.

Connect Site 50/60- and 400-Hz Power Wiring to IOUs

Use this procedure to connect power for the IOU and optional IOUs. Depending on site preparations, power connections to the units are by plug-in power connectors or direct wiring. Direct wiring requires the use of a licensed electrician.

- ___ 1. Be sure that:
 - ___ a. Site 50/60- and 400-Hz power for IOU and optional IOUs is off.
 - ___ b. Preinstallation power inspection has been completed and power wiring is correct.
- ___ 2. Perform applicable group of substeps:
 - For power cord plug-to-receptacle connections:
 - ___ a. Pull preattached 60- and 400-Hz power cords down through IOU and floor cutouts.
 - ___ b. Connect power cord plugs to customer-installed 60- and 400-Hz mating receptacles under raised floor.
 - For direct-wire connections, a licensed electrician must:
 - ___ a. Remove power input box cover (figure 2-57). Install cover in a later procedure.
 - ___ b. Disconnect, remove, and discard 60- and 400-Hz power cords (if present) from power input box TB1 and TB2.
 - ___ c. Follow local codes and connect site power wiring to TB1 (50/60 Hz) and TB2 (400 Hz) in power input box. (A Control Data customer engineer must supervise these connections.)
- ___ 3. Check power label in front of cable cutout for correct identification of unit voltages. If label is incorrect:
 - ___ a. Cross out label with permanent marker.
 - ___ b. Order new label (P/N 18989236) through site parts ordering process.
 - ___ c. Mark new label with current voltages.
 - ___ d. Replace old label with new label.
- ___ 4. Repeat this procedure for:
 - ___ a. Optional IOU expansion.
 - ___ b. Optional standalone IOU.
 - ___ c. Optional standalone IOU expansion.

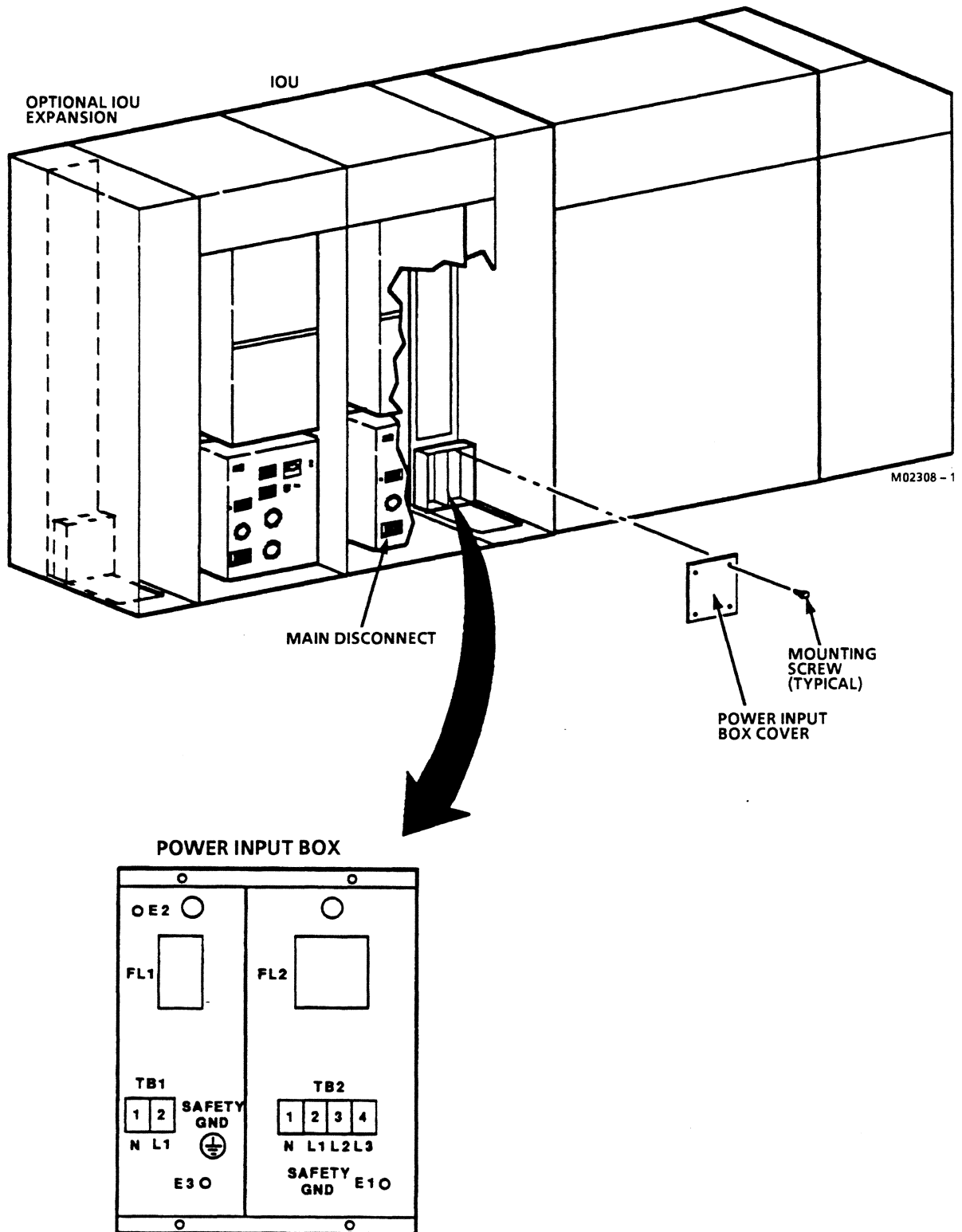


Figure 2-57. Power Connections to IOU

Connect Site 50/60- and 400-Hz Power Wiring to Power Unit

Use this procedure to connect power to the power unit. Depending on site preparations, power connections to the unit are by plug-in power connectors or direct wiring. Direct wiring requires the use of a licensed electrician.

- ___ 1. Be sure that:
 - ___ a. Site 50/60- and 400-Hz power for power unit is off.
 - ___ b. Preinstallation power inspection has been completed and power wiring is correct.
- ___ 2. Perform applicable group of substeps:
 - For power cord plug-to-receptacle connections:
 - ___ a. Locate power unit power cord plugs and customer-installed 60- and 400-Hz receptacles under raised floor.
 - ___ b. Connect power cord plugs to customer-installed 50/60- and 400-Hz mating receptables.
 - For direct-wire connections, a licensed electrician must:
 - ___ a. Remove power unit rear airflow control panel, if not previously removed. Install panel in a later procedure.
 - ___ b. Remove power input box cover (figure 2-58). Install cover in a later procedure.
 - ___ c. Disconnect, remove, and discard 60- and 400-Hz power cords (if present) from power input box TB1 and TB2.
 - ___ d. Follow local codes and connect site power wiring to TB1 (50/60 Hz) and TB2 (400 Hz) in power input box. (A Control Data customer engineer must supervise these connections.)

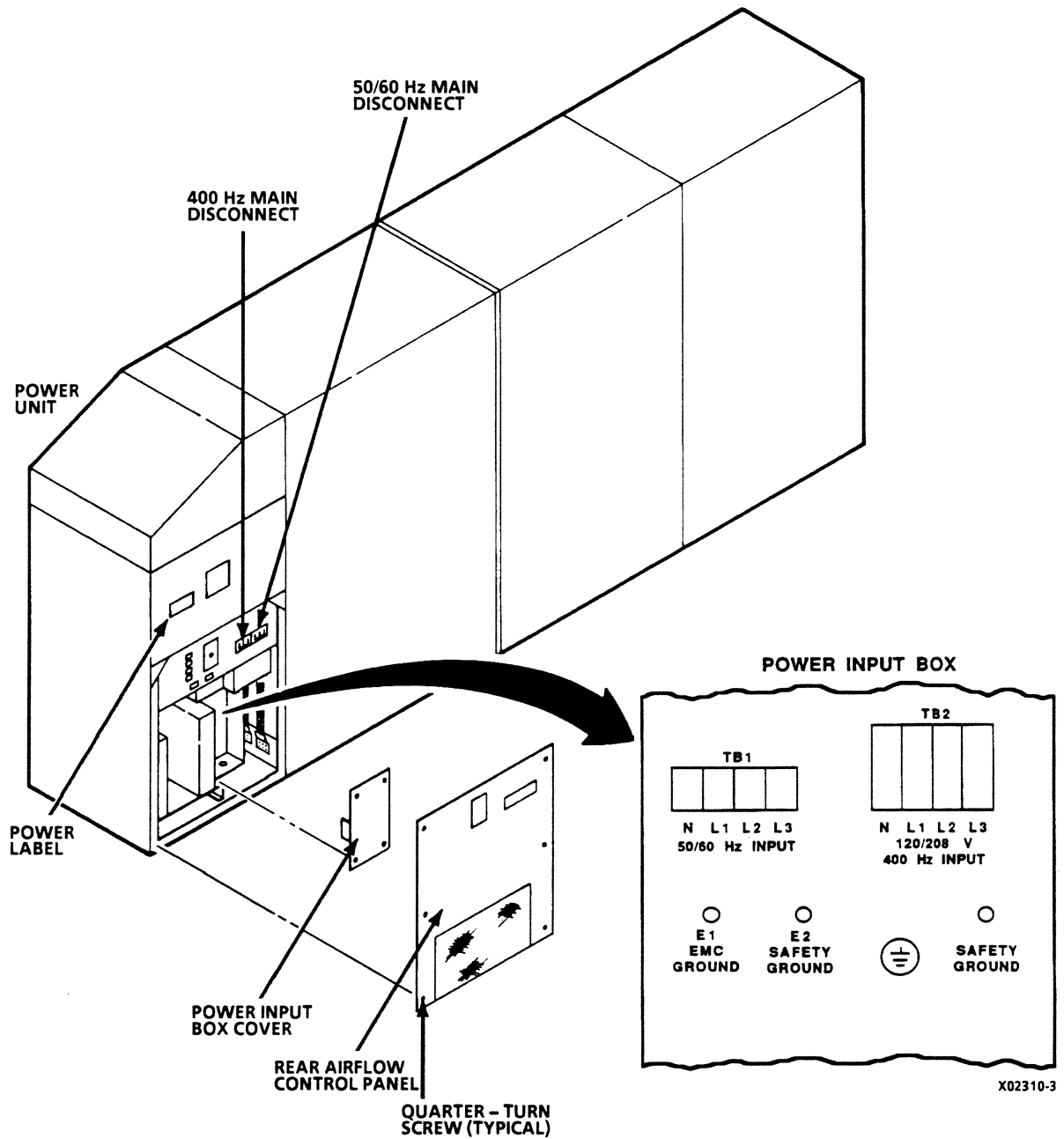


Figure 2-58. Power Connections to Power Unit

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Applying Initial Power

The following procedures describe the checks and adjustments necessary to bring the mainframe to an initial state of operation. These procedures assume that all parts of the mainframe are in correct working order. The correction of any problem resulting from a malfunction must be referred to the maintenance manuals listed in the front of this manual.

The application of power requires that 50/60-Hz power be present at the mainframe and MG interface unit as defined in the site preparation manual.

- Check 50/60-Hz Input Voltage to Power Unit
- Check 50/60-Hz Input Voltage to IOU
- Check 400-Hz Input Voltage to Power Unit
- Adjust MG Output Voltage
- Check 400-Hz Input Voltage to IOU
- Check CPU Blower Rotation
- Adjust Power Unit Voltages
- Adjust Two-Port Multiplexer Power Supply
- Adjust IOU Voltages
- Check Power Off and Emergency Off

NOTE

The EMERGENCY OFF button on the front of the power unit may be used in an emergency to remove 50/60- and 400-Hz power from the power unit and CPU. When, and only when, the power unit controls the 400-Hz power to the IOUs through the MG interface unit, the EMERGENCY OFF button may also be used to remove 400-Hz power from the IOUs.

CAUTION

Following the equipment shipment, condensation may form and remain for some time if the equipment moves from a cold to a warm area. Damage may occur if power is applied during this time. To avoid this damage, thoroughly inspect the equipment before applying power to ensure that condensation is not present.

Check 50/60-Hz Input Voltage to Power Unit

Use this procedure to check the 3-phase, 50/60-Hz voltage to the power unit.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Remove power unit rear airflow control panel (figure 2-59), if not previously removed. Install panel in a later procedure.

⚠ WARNING

Power input box contains exposed terminals that contain dangerous voltages when site 50/60-Hz or 400-Hz power is on.

- ___ 3. Remove power input box cover, if not previously removed. Install cover in a later procedure.
- ___ 4. Set site 50/60-Hz power circuit breaker for power unit to ON.
- ___ 5. Use voltmeter to check that site 3-phase, 50/60-Hz voltage is present at TB1 between N (neutral) and L1, L2, and L3. Correct any voltage or wiring problems before continuing.

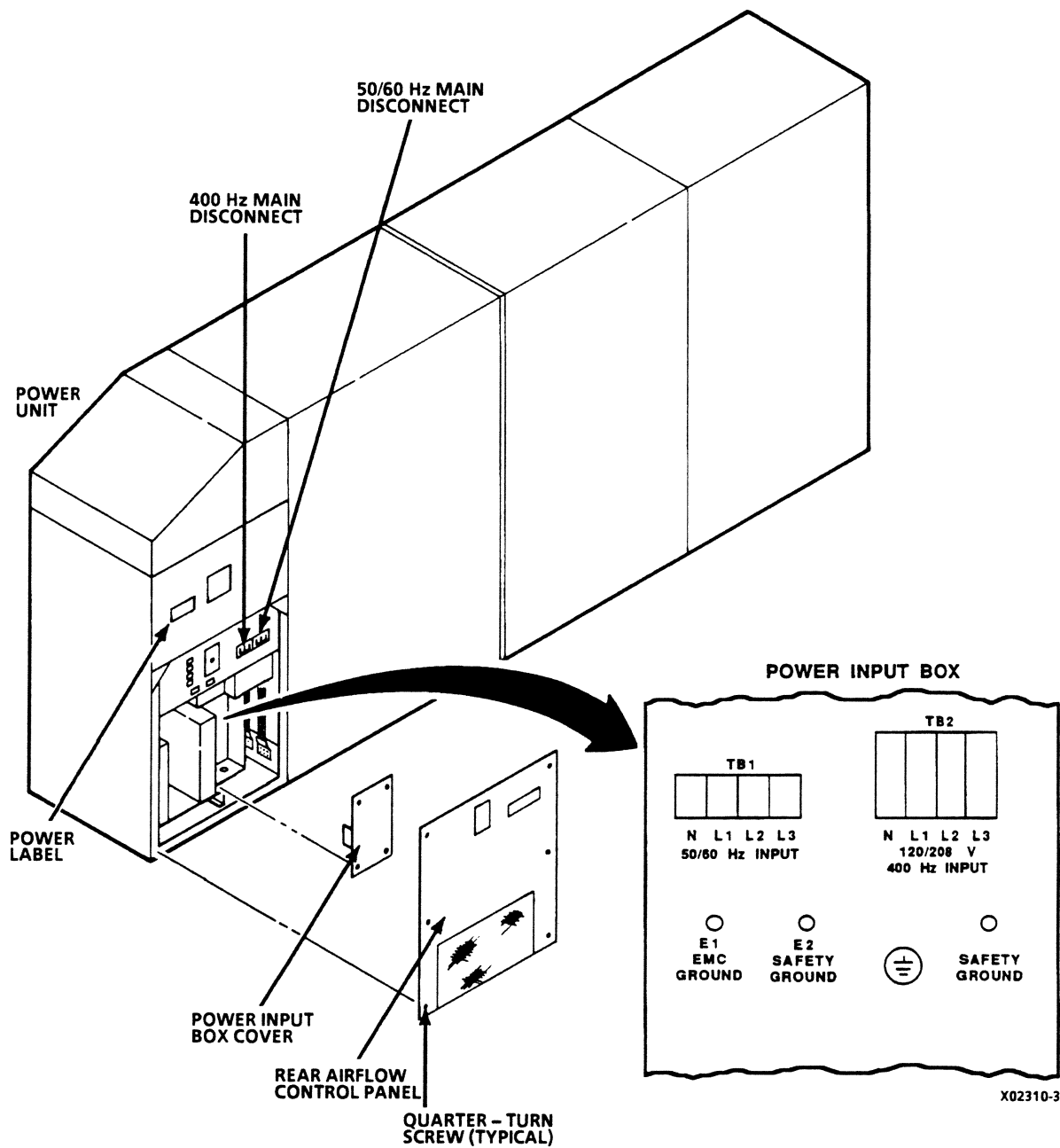


Figure 2-59. Power Unit 50/60-Hz Input Voltage Check

Check 50/60-Hz Input Voltage to IOU

Use this procedure to check the 1-phase, 50/60-Hz voltage to IOU and optional IOUs.

- ___ 1. Be sure that previous procedure is completed.

WARNING
--

Power input box contains exposed terminals that contain dangerous voltages when site 50/60- or 400-Hz power is on.

- ___ 2. Remove IOU power input box cover, if not previously removed. Install cover in a later procedure.
- ___ 3. Set site 50/60-Hz power circuit breaker for IOU to ON.
- ___ 4. Use voltmeter to check that site 1-phase, 50/60-Hz voltage is present at TB1 between terminals 1 and 2 (figure 2-60). Correct any voltage or wiring problems before continuing.
- ___ 5. Repeat this procedure for:
 - ___ a. Optional IOU expansion.
 - ___ b. Optional standalone IOU.
 - ___ c. Optional standalone IOU expansion

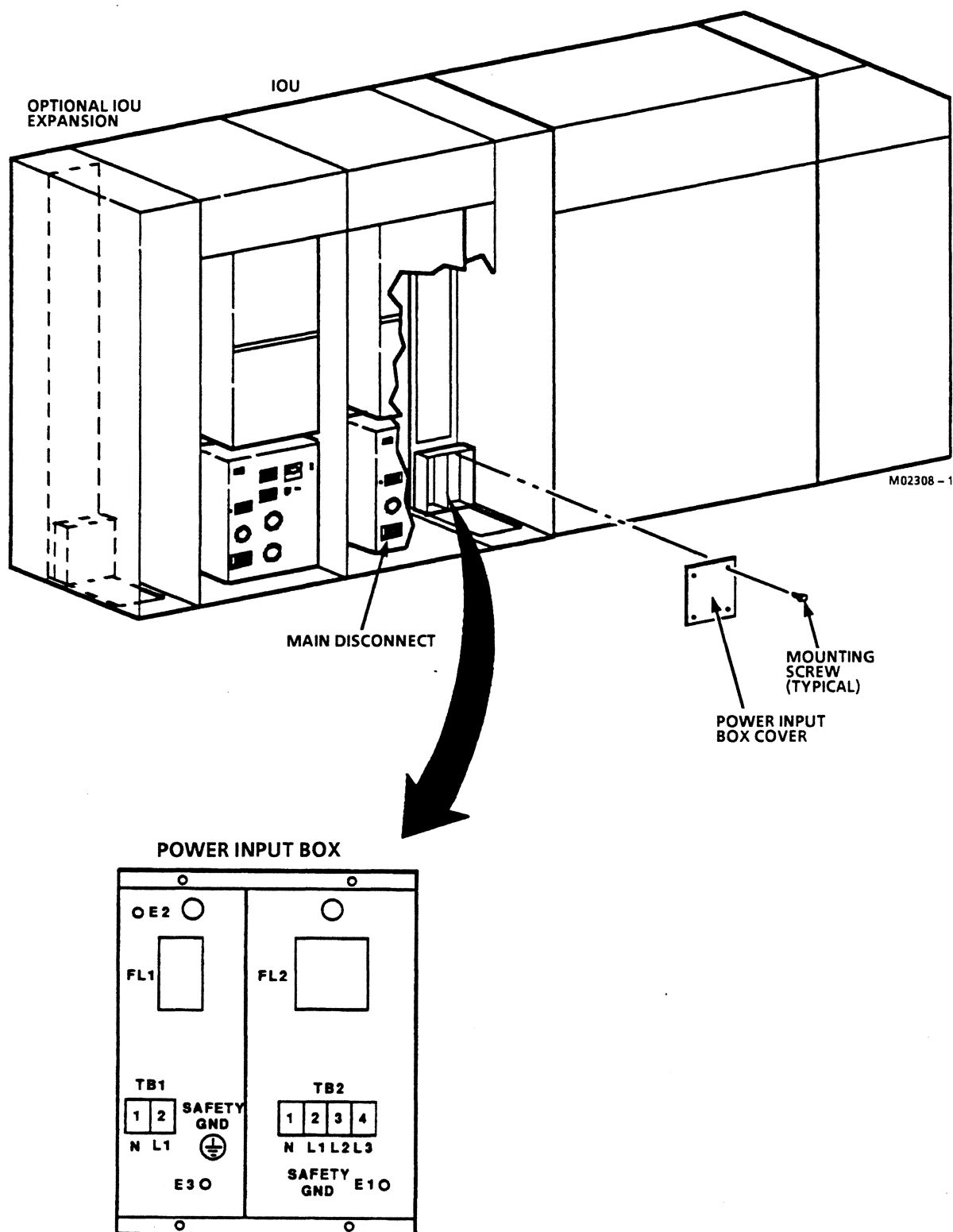


Figure 2-60. IOU 50/60-Hz Input Voltage Check

Check 400-Hz Input Voltage to Power Unit

Use this procedure to start the MG set and to check the MG voltage at the power unit.

- ___ 1. Be sure that:
 - ___ a. Previous procedure is completed.
 - ___ b. Checkout of the MG interface unit with the MG set was completed during installation of MG interface unit.
- ___ 2. Set site 50/60-Hz power circuit breakers that control power to MG set and MG interface unit to ON.
- ___ 3. Check that keyswitch on main control panel on front of power unit is set to LOCAL MODE (figure 2-61)
- ___ 4. Set NORMAL/DISABLE switch on SYSTEM POWER STATUS panel on front of power unit to DISABLE.

⚠ WARNING

Power input box contains exposed terminals that contain dangerous voltages when site 50/60- or 400-Hz power is on.

- ___ 5. Set site 400-Hz circuit breakers for power unit and MG interface unit to ON.
- ___ 6. Set only 50/60 Hz DISCONNECT at rear of power unit to 1 (ON).
- ___ 7. Press LOCAL ON switch/indicator on front of power unit. Indicator lights and MG starts. MG requires approximately 1 min to obtain full output voltage.
- ___ 8. Use voltmeter to check 3-phase, 400-Hz voltage is present at power unit power input box at TB1 between N (neutral) and L1, L2, and L3. Nominal voltage is 120 V. A later procedure performs final adjustment of this voltage. Correct any voltage or wiring problems before continuing.
- ___ 9. Set 50/60 Hz DISCONNECT at rear of power unit to 0 (OFF).
- ___ 10. Set site circuit breakers that control 400-Hz power to power unit to OFF.
- ___ 11. Set site circuit breakers that control 50/60-Hz power to power unit and to IOUs to OFF. This causes MG to shut off.
- ___ 12. Install cover on power input box.

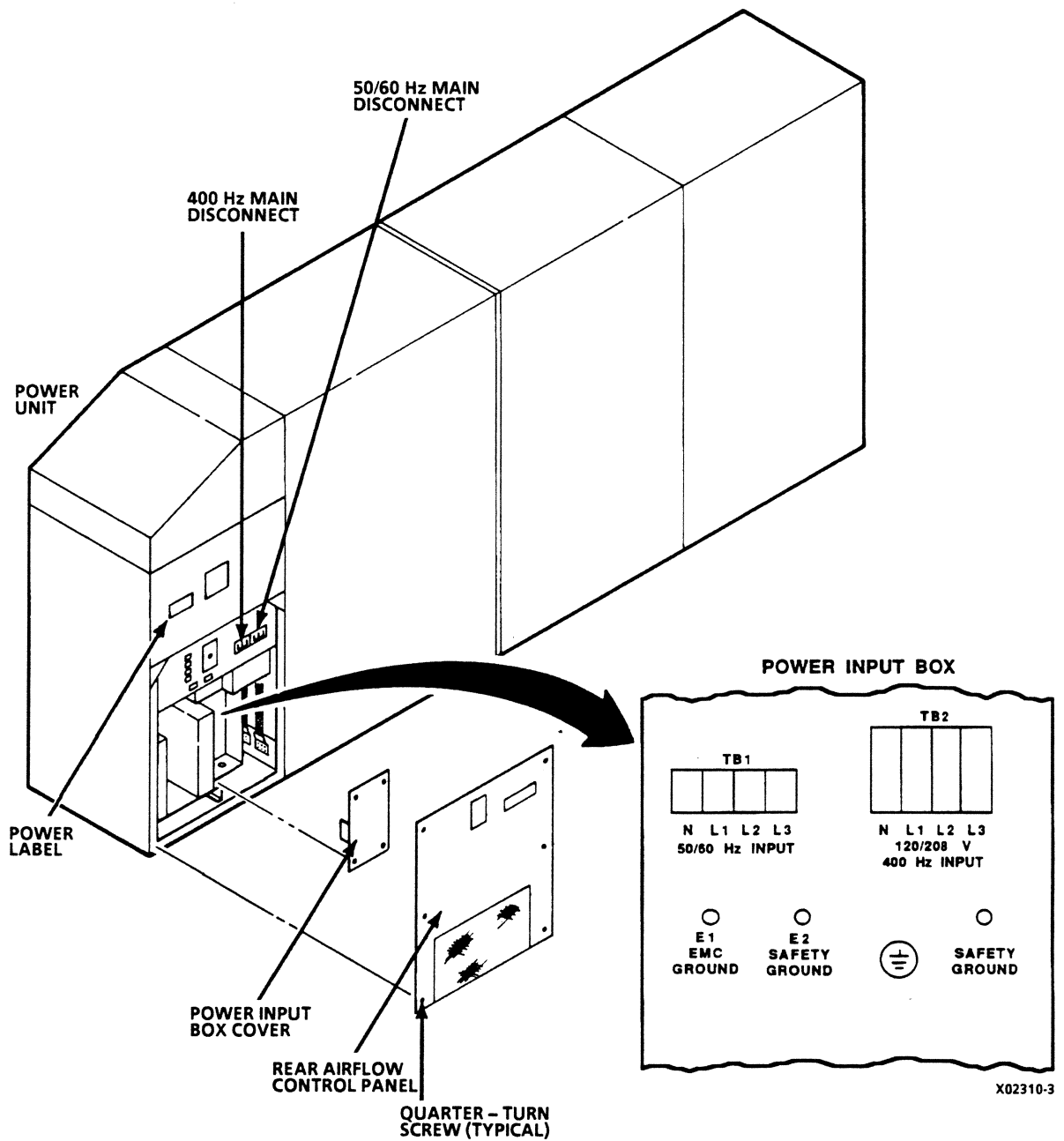


Figure 2-61. Power Unit 400-Hz Input Voltage Check

Adjust MG Output Voltage

Use this procedure to adjust the MG output voltage with controls on the power unit.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Set site 50/60-Hz power circuit breakers for power unit and IOUs to ON.
- ___ 3. Set site circuit breaker that controls 400-Hz power to power unit to ON.
- ___ 4. Set 50/60 Hz DISCONNECT at rear of power unit (figure 2-62) to 1 (ON).
- ___ 5. Set 400 Hz DISCONNECT at rear of power unit to 1 (ON).
- ___ 6. Press LOCAL ON switch/indicator on front of power unit. Indicator lights and MG starts. MG requires approximately 1 min to obtain full output voltage.
- ___ 7. Set Selector (left) rotary switch on CABINET POWER STATUS panel to MG 1.
- ___ 8. Set Function (right) rotary switch to 1. DATA display reads MG phase 1 output voltage.

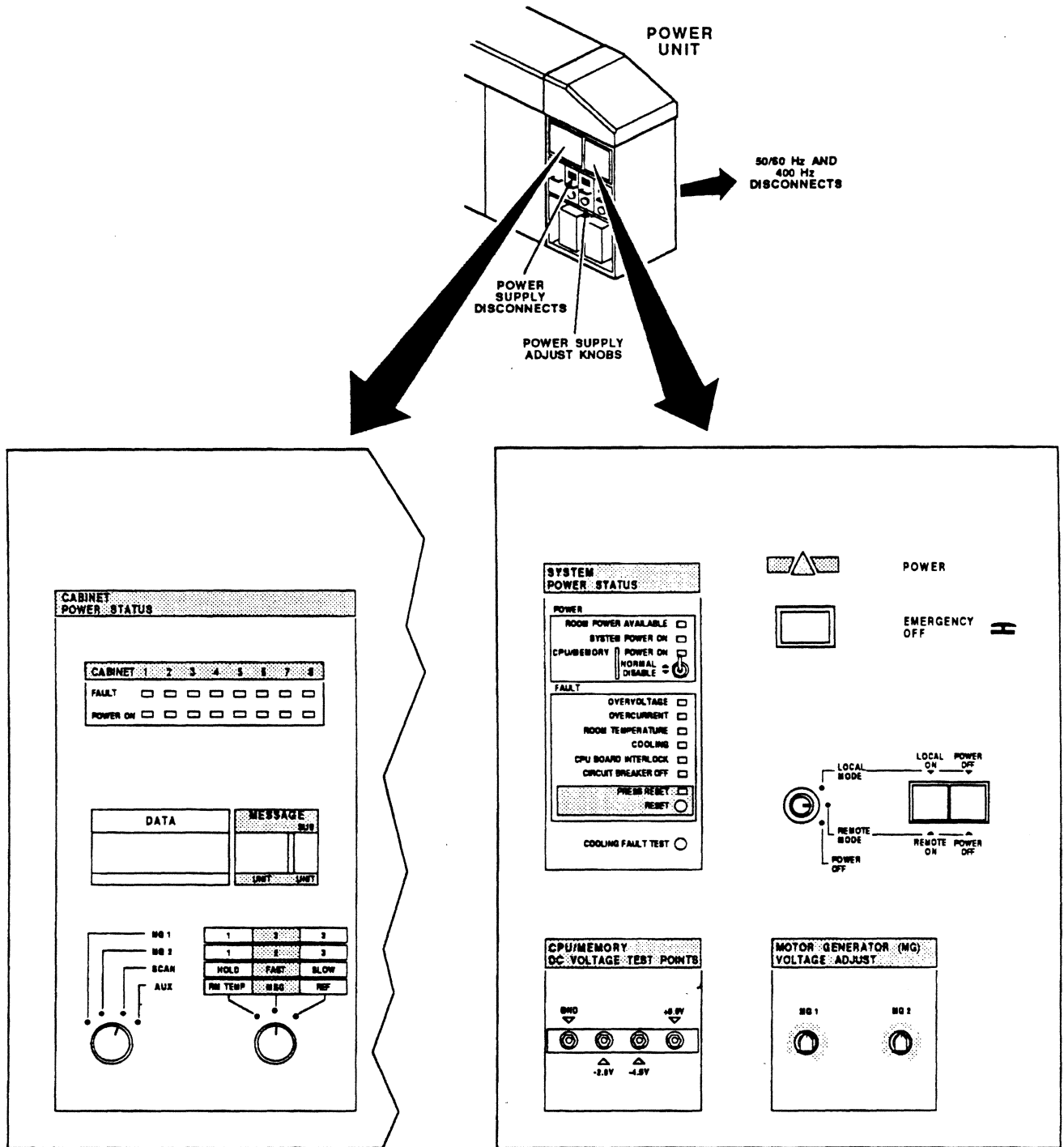
NOTE

Check all three phases before adjusting the MG output. Individual phases can be checked, but the MG adjustment raises or lowers the total MG output, not just the phase being displayed.

- ___ 9. Turn, if necessary, MG 1 knob on MOTOR GENERATOR (MG) VOLTAGE ADJUST panel to obtain an MG phase 1 output of 120 V.
- ___ 10. Check voltage of MG output phases 2 and 3 in same manner, setting Function (right) rotary switch to display phases 2 and 3. Voltage differences between any two phases should be within 2.1 V.

NOTE

MG must remain in operation to continue.



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Figure 2-62. MG Set Startup Controls

Check 400-Hz Input Voltage to IOU

Use this procedure to check the 3-phase, 400-Hz voltage to IOU and optional IOUs.

- ___ 1. Be sure that previous procedure is completed.

⚠ WARNING

Power input box contains exposed terminals that contain dangerous voltages when site 50/60-Hz or 400-Hz power is on.

- ___ 2. Set site 400-Hz power circuit breaker for IOU to ON.
- ___ 3. Use voltmeter to check 3-phase, 400-Hz voltage is present at power input box TB1 between N (neutral) and L1, L2, and L3 (figure 2-63). Nominal voltage is 120 V.
- ___ 4. Repeat steps 2 and 3 for:
 - ___ a. Optional IOU expansion.
 - ___ b. Optional standalone IOU.
 - ___ c. Optional standalone IOU expansion.
- ___ 5. Set site 400-Hz power circuit breakers for IOU and optional IOUs to OFF.
- ___ 6. Set site 50/60-Hz power circuit breakers for IOU and optional IOUs to OFF.
- ___ 7. Install power input box covers on IOU and optional IOUs.
- ___ 8. Set site 50/60-Hz power circuit breakers for IOU and optional IOUs to ON.
- ___ 9. Set site 400-Hz power circuit breakers for IOU and optional IOUs to ON.

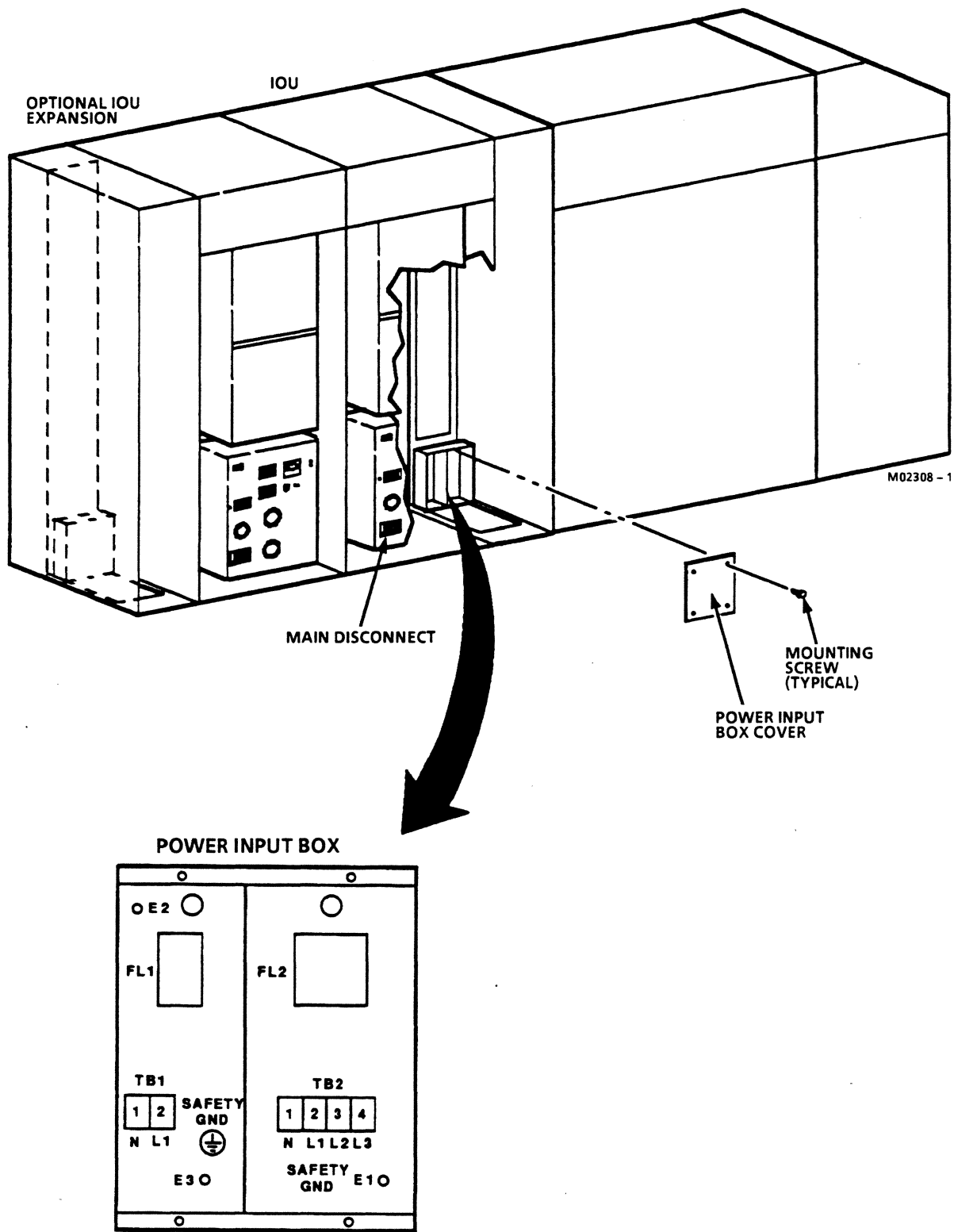


Figure 2-63. IOU 400-Hz Voltage Check

Check CPU Blower Rotation

Use this procedure to check for correct CPU blower rotation and, if necessary, to reverse the rotation.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Set 120V 50/60 Hz CONTROL on power unit AUX. BULK POWER SUPPLY to on (up).
- ___ 3. Set power unit power supply controls as follows.
 - ___ a. +5.0V POWER SUPPLY DISCONNECT to ON.
 - ___ b. -2.0V POWER SUPPLY DISCONNECT to ON.
 - ___ c. -4.5V POWER SUPPLY DISCONNECT to ON.
- ___ 4. Check that NORMAL/DISABLE switch on SYSTEM POWER STATUS panel is set to DISABLE.
- ___ 5. Press LOCAL ON switch/indicator on front of power unit.
- ___ 6. Press RESET switch on SYSTEM POWER STATUS panel.
- ___ 7. Set NORMAL/DISABLE switch momentarily to NORMAL. This applies momentary power to blower, causing it to rotate.
- ___ 8. Observe blower through viewing port at rear of power unit. Left-to-right rotation must be confirmed by observation.

If rotation is incorrect:

 - ___ a. Remove rear airflow control panel (figure 2-64), if not previously removed.
 - ___ b. Set 50/60 Hz and 400 Hz DISCONNECTs at rear of power unit to 0 (OFF).
 - ___ c. Reverse jumper plug location at rear of power unit from J10 to J11 or from J11 to J10.
 - ___ d. Set 50/60 Hz and 400 Hz DISCONNECTs to 1 (ON).
 - ___ e. Recheck blower rotation.
- ___ 9. Set NORMAL/DISABLE switch to NORMAL.
- ___ 10. Install front and rear airflow control panels on power unit.

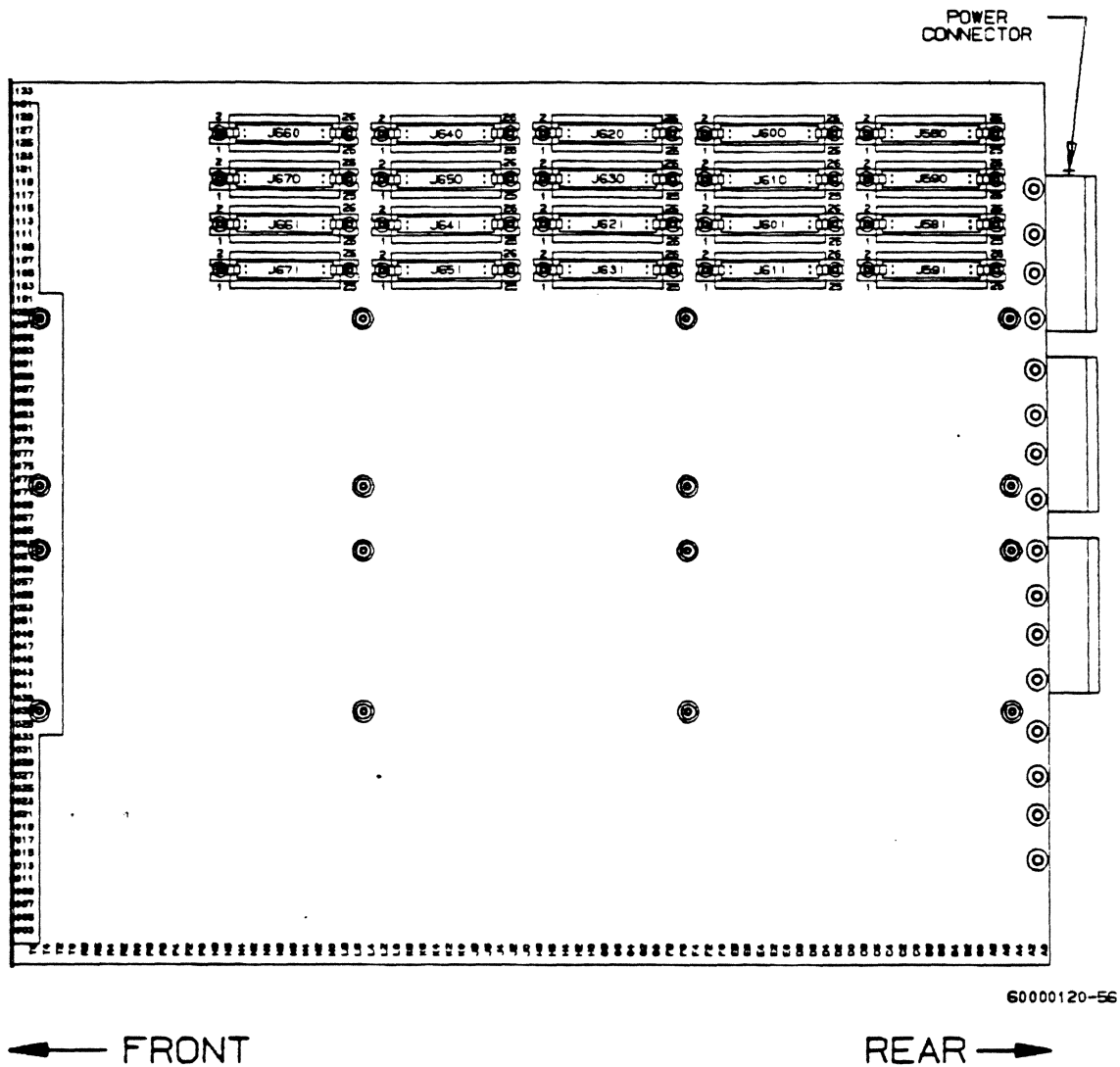


Figure 2-52. Remote IOU Interface Module Cabling

CONTROLS ON FRONT OF POWER UNIT

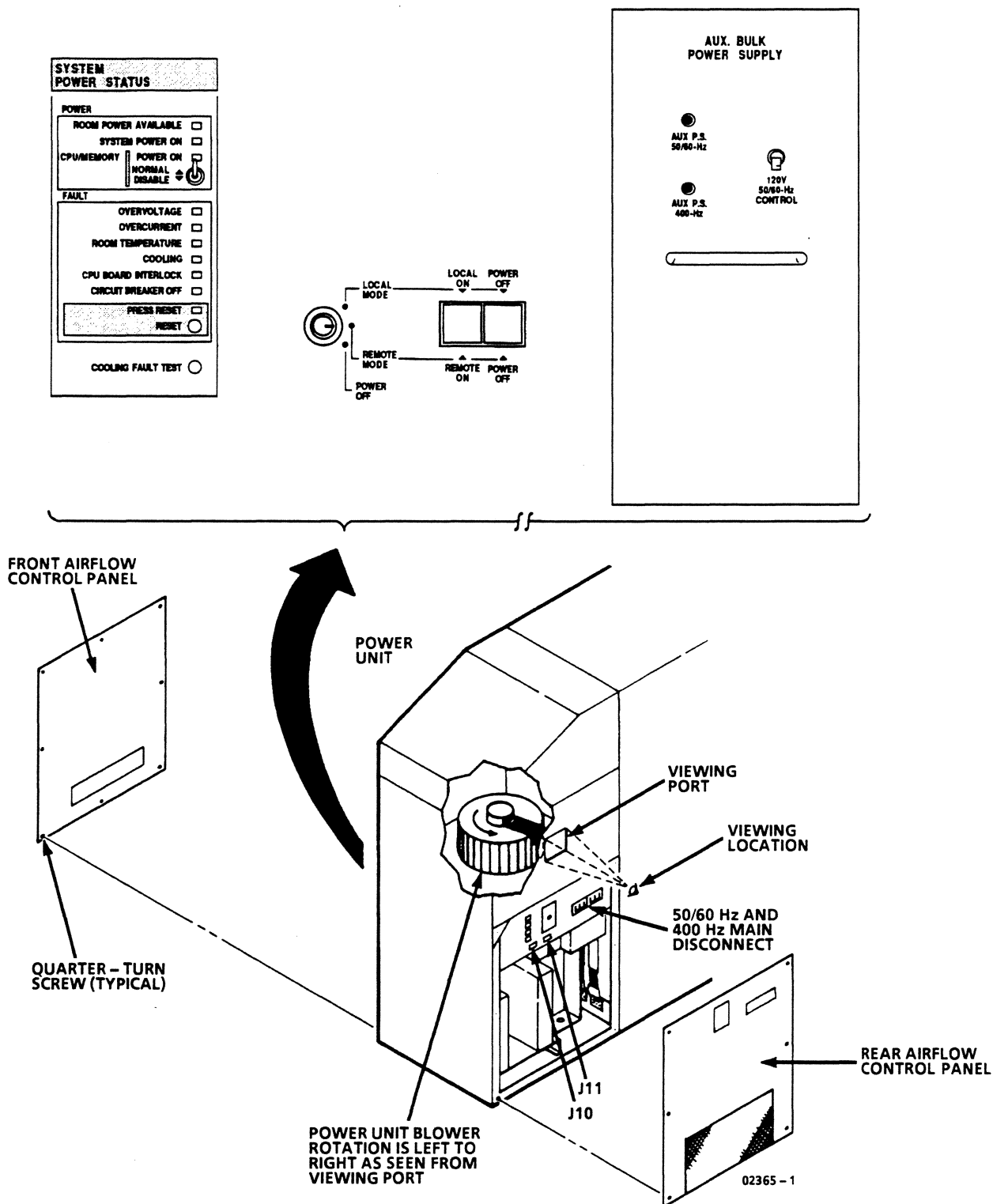
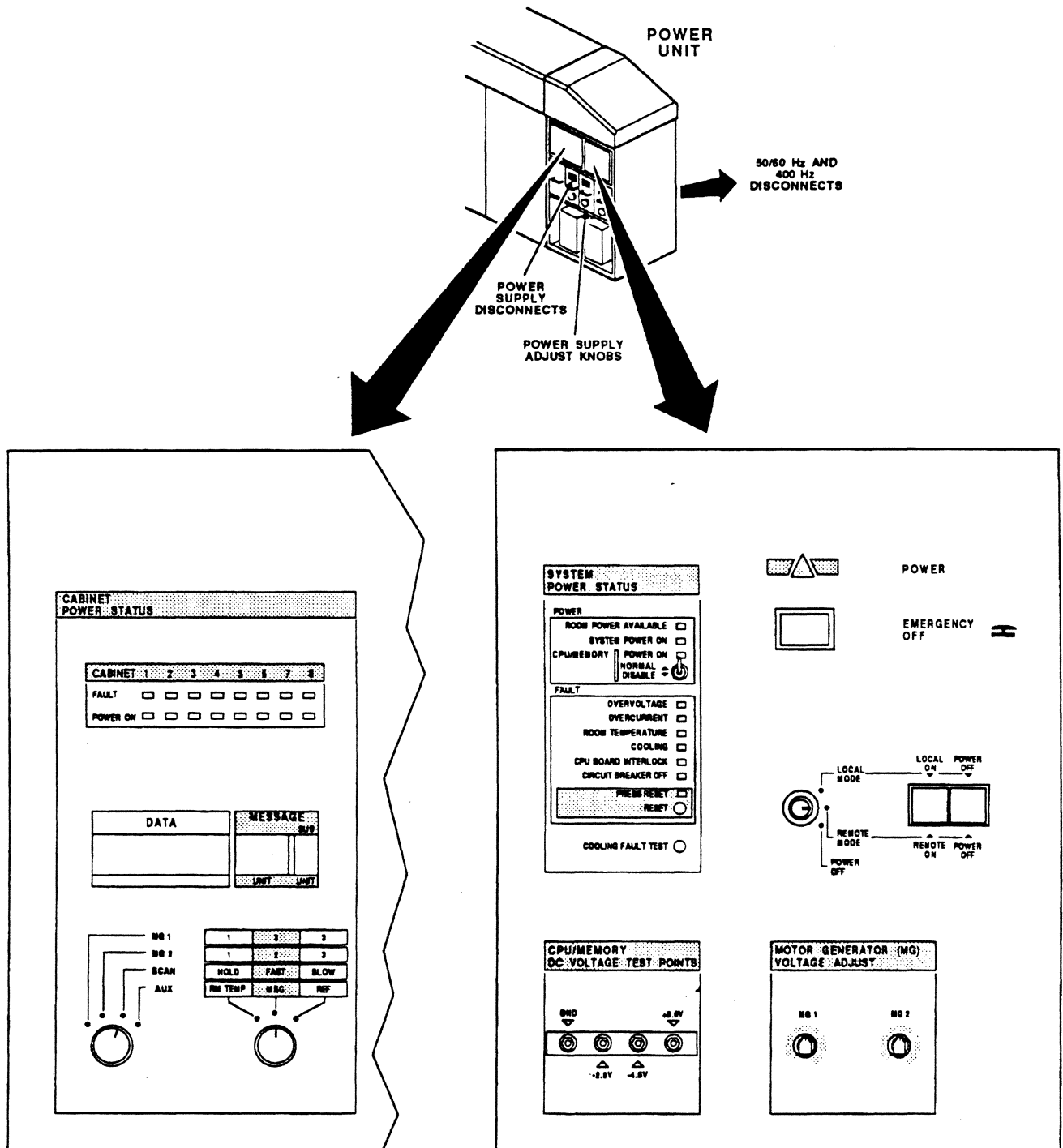


Figure 2-64. CPU Blower Rotation Check

Adjust Power Unit Voltages

Use this procedure to adjust power unit dc voltages during the initial application of power.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Connect voltmeter between GND and -2.0V test points on control panel (figure 2-65).
- ___ 3. Turn -2.0-V power supply ADJUST knob to obtain a voltmeter reading of -2.03 V.
- ___ 4. Connect voltmeter between GND and -4.50 V test points.
- ___ 5. Turn -4.5-V power supply ADJUST knob to obtain a voltmeter reading of -4.53 V.
- ___ 6. Connect voltmeter between GND and +5.0 V test points.
- ___ 7. Turn +5.0-V power supply ADJUST knob to obtain a voltmeter reading of +5.03 V.



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Figure 2-65. Power Unit Voltage Adjustment Controls

Adjust Two-Port Multiplexer Power Supply

Use this procedure to turn on and adjust the +5 V of the two-port multiplexer power supply in the IOU and optional standalone IOU.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Set MUX POWER DISCONNECT switch on IOU two-port multiplexer power supply to 1 (on), if not previously done. Power supply is accessible from front right side of IOU (figure 2-66).
- ___ 3. Connect voltmeter between COM and +5V test points.
- ___ 4. Turn +5V ADJUST on top of power supply with insulated tuning wand to obtain voltmeter reading of +5.01 V.

NOTE

The +12V and -12V supplies cannot be adjusted. If readings are not within specifications, power supply must be replaced. Consult maintenance manual for procedure.

- ___ 5. Connect voltmeter between COM and +12V test points and then between COM and -12V test points to ensure +12V and -12V are present within 0.6 V.
- ___ 6. Disconnect voltmeter.
- ___ 7. Repeat this procedure for optional standalone IOU.

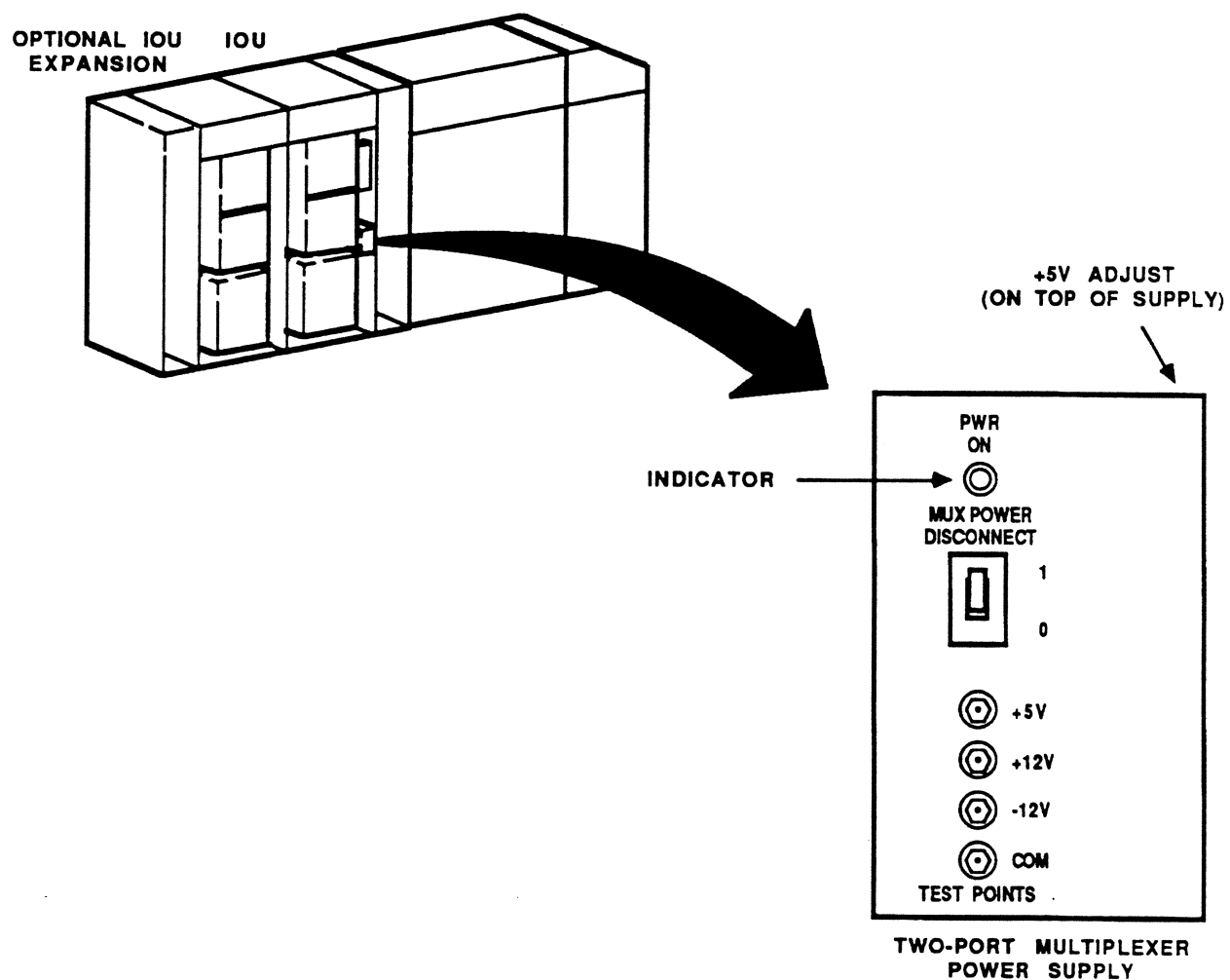


Figure 2-66. Two-Port Multiplexer Power Supply Adjustment

Adjust IOU Voltages

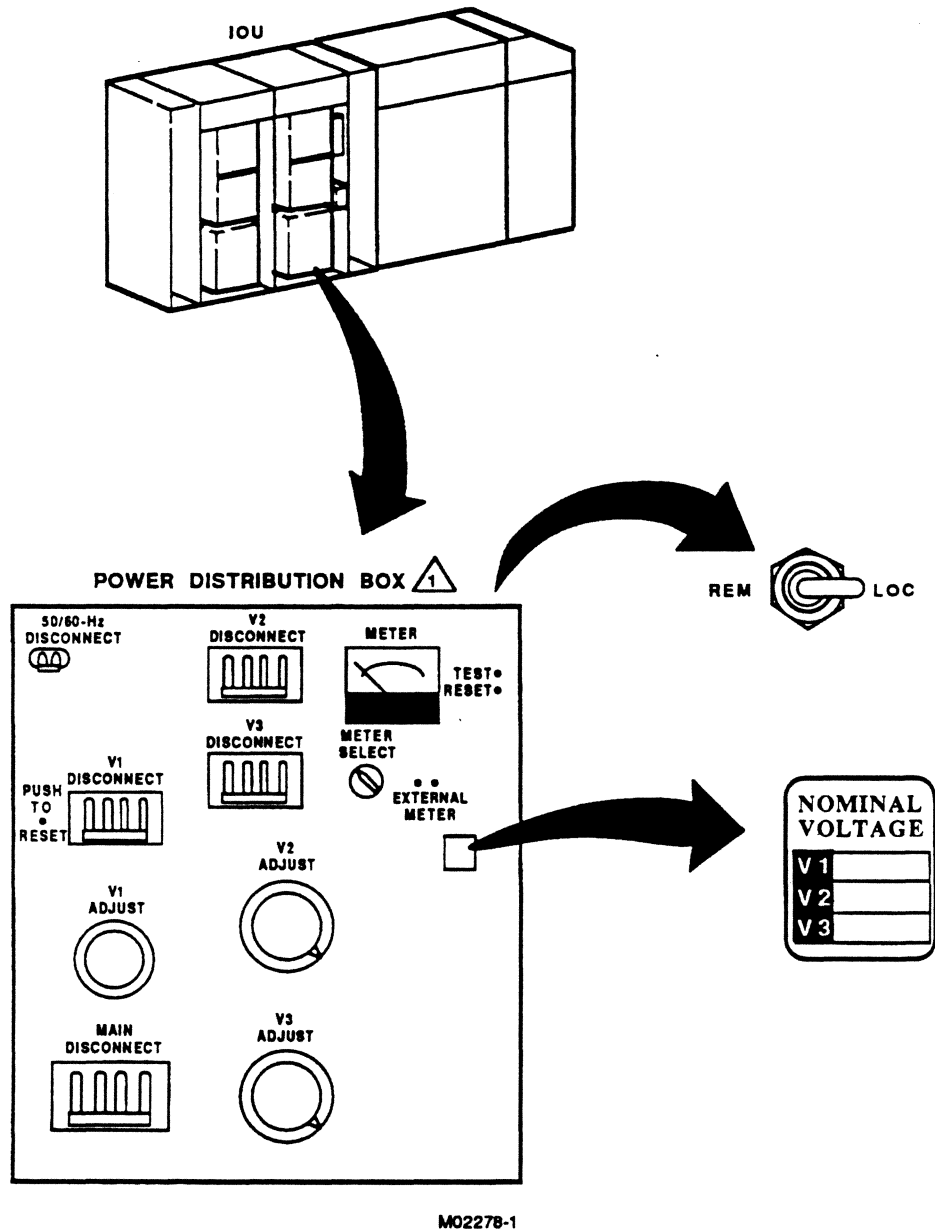
Use this procedure to adjust IOU dc voltages during the initial application of power to the IOU and optional IOUs.

- ___ 1. Be sure that procedure to check seating of IOU logic modules is completed.
- ___ 2. Set 50/60 Hz DISCONNECT on IOU power distribution box to 1 (ON).
- ___ 3. Apply power sequentially at power distribution box (figure 2-67) as follows:
 - ___ a. V1 DISCONNECT to 1 (ON).
 - ___ b. V2 DISCONNECT to 1 (ON).
 - ___ c. V3 DISCONNECT to 1 (ON), if present.
 - ___ d. MAIN DISCONNECT to 1 (ON).
 - ___ e. Press RESET switch.

CAUTION
--

IOU blower must be operating to continue.

- ___ 4. Listen for noise of circulating air to indicate blower operation.



NOTE:

1 THIS POWER DISTRIBUTION BOX IS TYPICAL FOR ALL IOUs EXCEPT THE CYBER 960 WHICH DOES NOT HAVE V3.

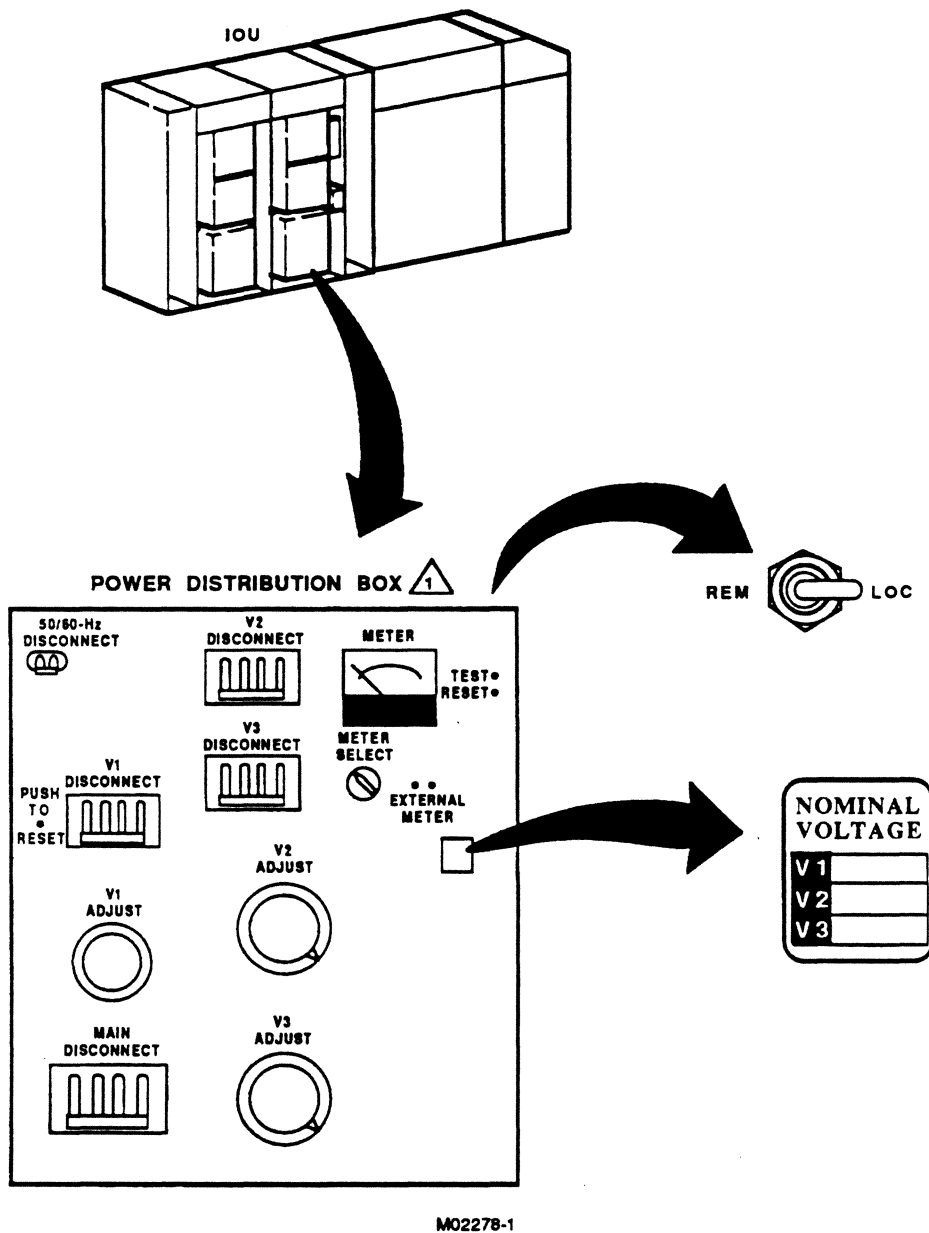
Figure 2-67. IOU Voltage Adjustment Controls

- ___ 5. Check percentage METER mechanical zero (figure 2-68):
 - ___ a. Set METER SELECT switch to OFF.
 - ___ b. Observe that meter needle rests on left indicator line. If necessary, adjust needle to line with screw on front of meter.
- ___ 6. Connect voltmeter to EXTERNAL METER test points.
- ___ 7. Adjust V1 voltage:
 - ___ a. Set METER SELECT switch to V1.
 - ___ b. Turn V1 ADJUST knob slowly until external voltmeter indicates V1 voltage printed on NOMINAL VOLTAGE label. Percentage meter indicates 0. Refer to IOU Hardware Maintenance Manual listed in About this Manual if further adjustments are required to obtain a 0 meter indication.
- ___ 8. Adjust V2 voltage in the same way as V1.

NOTE

Perform V3 voltage adjustment only after the V1 and V2 adjustments.

- ___ 9. Adjust V3 voltage in the same way as V1, if present.
- ___ 10. Disconnect voltmeter.
- ___ 11. Set mode switch to REM (remote).
- ___ 12. Repeat this procedure for:
 - ___ a. Optional IOU expansion.
 - ___ b. Optional standalone IOU.
 - ___ c. Optional standalone IOU expansion.



NOTE:

1 THIS POWER DISTRIBUTION BOX IS TYPICAL FOR ALL IOUs EXCEPT THE CYBER 960 WHICH DOES NOT HAVE V3.

Figure 2-68. IOU Voltage Adjustment Controls

Check Power Off and Emergency Off

Use this procedure to check the emergency-off and power-off switch functions on the power unit.

- ___ 1. Be sure that all previous procedures are completed.

CAUTION

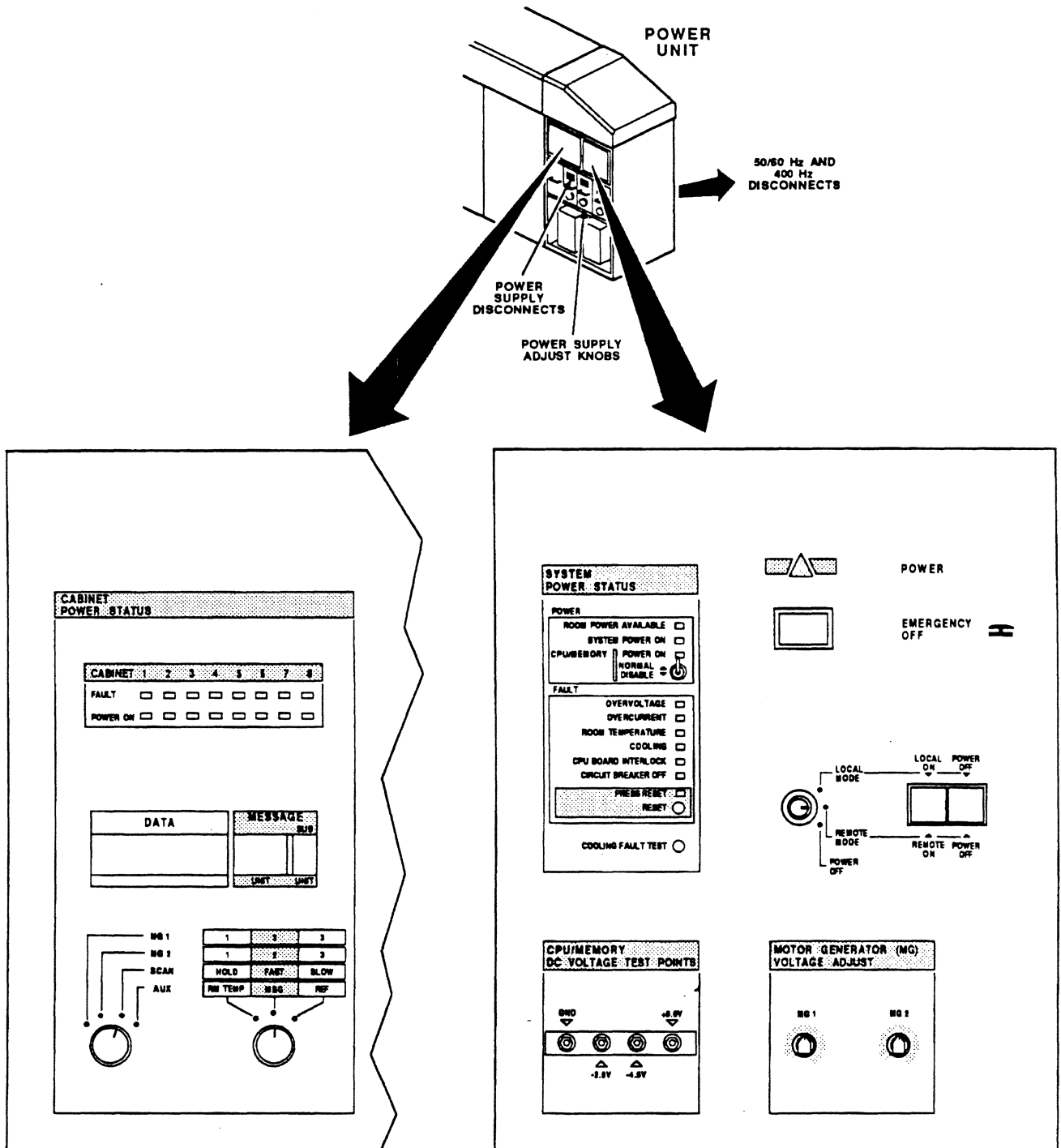
The following steps shut off the MG set on two occasions which disrupt the operation of equipment connected to it. Before performing the steps, obtain approval from site personnel.

- ___ 2. Press POWER OFF switch on front of power unit. This shuts off MG set and turns off SYSTEM POWER ON and POWER ON indicators on SYSTEM POWER STATUS panel.

CAUTION

Allow sufficient time for MG to stop completely before powering back up.

- ___ 3. Press LOCAL ON switch on front of power unit. This starts MG set, which requires approximately 1 min to reach full output voltage, and lights SYSTEM POWER ON and POWER ON indicators.
- ___ 4. Press EMERGENCY OFF switch on front of power unit (figure 2-69). This causes power unit 50/60 Hz and 400 Hz DISCONNECTS to trip to 0 (OFF).
- ___ 5. Begin power-on sequence by setting 50/60 Hz and 400 Hz DISCONNECTS at rear of power unit to 1 (ON). ROOM POWER AVAILABLE indicator on SYSTEM POWER STATUS panel lights.
- ___ 6. Check that NORMAL/DISABLE switch on power unit SYSTEM POWER STATUS panel is set to NORMAL.
- ___ 7. Press RESET switch on SYSTEM POWER STATUS panel. Indicator labeled PRESS RESET extinguishes.
- ___ 8. Press LOCAL ON switch on front of power unit. This causes:
 - ___ a. Application of internal 50/60- and 400-Hz power to mainframe units.
 - ___ b. SYSTEM POWER ON and POWER ON indicators on SYSTEM POWER STATUS panel to light.



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Figure 2-69. Power ON and Off Controls

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Checking IOU Scanning Functions

The following procedures describe checks for the power unit scanning functions for the IOU and optional IOUs.

- Check Scanning of IOU Power Supply Voltages
- Check Scanning of IOU Temperatures

Check Scanning of IOU Power Supply Voltages

Use this procedure to check IOU voltage scanning and display functions at the power unit CABINET POWER STATUS panel.

- ___ 1. Be sure that previous procedures are completed.
- ___ 2. Set LOCAL/REMOTE switch on IOU power distribution boxes to REMOTE.
- ___ 3. Set Selector (left) rotary switch on CABINET POWER STATUS panel to SCAN (figure 2-70).
- ___ 4. Set NORMAL/DISABLE switch on SYSTEM POWER STATUS panel to NORMAL.
- ___ 5. Set Function (right) rotary switch to FAST or SLOW:
 - ___ a. When code C21 appears in MESSAGE display, quickly set Function switch to HOLD. (Scanning stops and IOU power supply voltage V2 appears in DATA display.)
 - ___ b. Select remaining codes listed in table 2-17 and read their associated power supply voltages for IOU and each optional IOU.

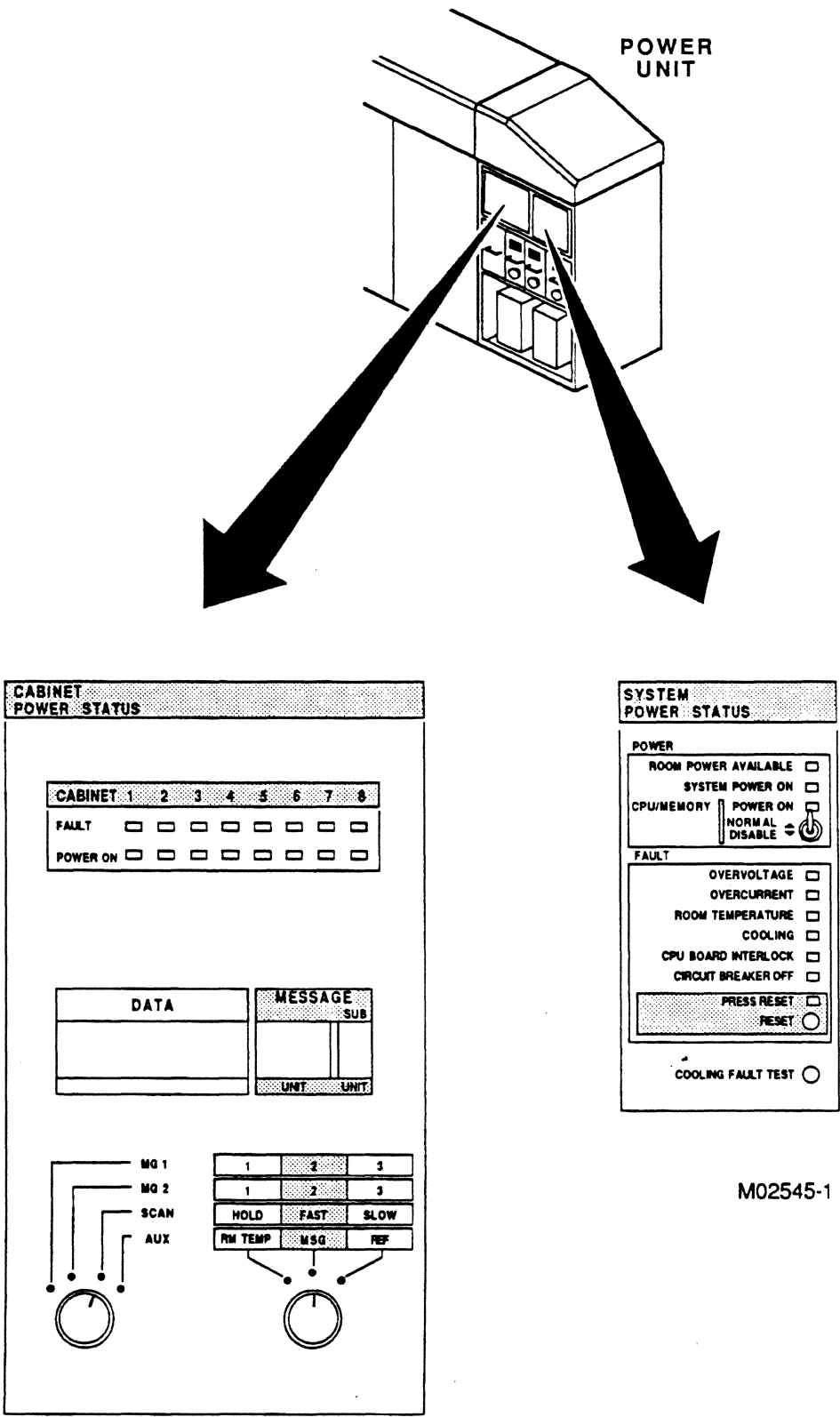
Table 2-17. Scanning Codes for IOU Power Supply Voltages

Unit	Scanning Code ¹	Scanned Voltage ²
IOU	C21	-5.20 $\pm$ 0.10 V
	C22	-2.20 $\pm$ 0.40 V
	C23	+5.00 $\pm$ 0.10 V
	C24	-12.00 $\pm$ 0.60 V
	C25	+5.00 $\pm$ 0.10 V
	C26	+12.00 $\pm$ 0.60 V
Optional IOU Expansion	C31	-5.20 $\pm$ 0.10 V
	C32	-2.20 $\pm$ 0.40 V
	C33	+5.00 $\pm$ 0.10 V
Optional Standalone IOU	C41	-5.20 $\pm$ 0.10 V
	C42	-2.20 $\pm$ 0.40 V
	C43	+5.00 $\pm$ 0.10 V
	C45	-12.00 $\pm$ 0.60 V
	C46	+5.00 $\pm$ 0.10 V
	C47	+12.00 $\pm$ 0.60 V
Optional Standalone IOU Expansion	C51	-5.20 $\pm$ 0.10 V
	C52	-2.20 $\pm$ 0.40 V
	C53	+5.00 $\pm$ 0.10 V

Notes:

1.Code appears in MESSAGE display on power status panel. Code only appears if unit is present.

2.Voltage appears in DATA display on power status panel.



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Figure 2-70. IOU Voltage Scanning Controls

Check Scanning of IOU Temperatures

Use this procedure to check IOU temperature scanning and display functions at the CABINET POWER STATUS panel.

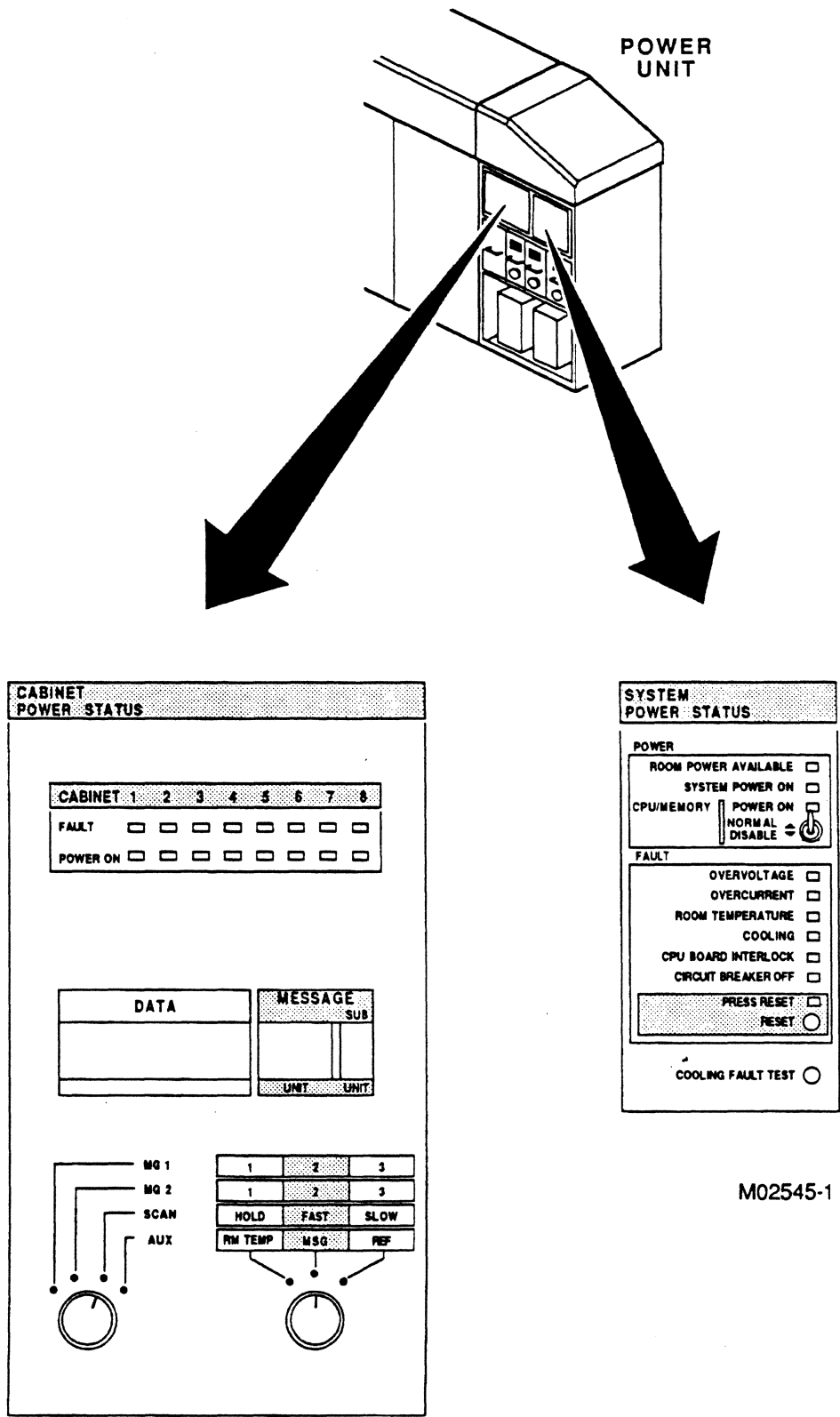
- ___ 1. Set Selector (left) rotary switch on CABINET POWER STATUS panel to SCAN (figure 2-71).
- ___ 2. Set NORMAL/DISABLE switch on SYSTEM POWER STATUS panel to NORMAL.
- ___ 3. Set Function (right) rotary switch to FAST or SLOW:
 - ___ a. When code HF1 appears in MESSAGE display, quickly set Function switch to HOLD. (Scanning stops and IOU temperature shown in table 2-18 appears in DATA display.)
 - ___ b. Select remaining codes listed in table 2-18 and read their associated temperature displays for IOU and each optional IOU.

Table 2-18. Scanning Codes for IOU Temperatures

Unit	Maximum Outlet Air Temperature 135°F	Maximum Power Heat Sink Temperature 180°F	Maximum Inlet Air Temperature 95°F
IOU	HF1	HF2	HF3
Optional IOU Expansion	EF1	EF2	EF3
Optional Standalone IOU	LF1	LF2	LF3
Optional Standalone IOU Expansion	PF1	PF2	PF3

Note:

Temperatures may vary between IOUs, depending on options installed in the units.



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Figure 2-71. IOU Temperature Scanning Controls

Checking EMI Seals

Use this procedure for final inspection and preparation of the equipment operating electromagnetic interference (EMI) seals.

- ___ 1. Be sure that previous procedures are completed.
- ___ 2. Install, but do not close, each removed door as follows:
 - ___ a. Wear antistatic smock and wrist strap.
 - ___ b. Move door or panel near to installation location.
 - ___ c. Hold door or panel with one hand and connect ground wire from wrist strap to equipment frame ground with other hand.
 - ___ d. Install door or panel on equipment.
- ___ 3. Open all doors and inspect copper fingers (figure 2-72). Replace any 25 mm (1 in) or greater section of adjacent fingers that are missing or deformed and will not compress between door and unit. (Replacement copper fingers are supplied with equipment.)
- ___ 4. Inspect all door closures to ensure that copper fingers compress against unit frames. Adjust door cam latches as necessary to correct any loosely fitting doors.
- ___ 5. Close all doors and completely rotate door cams cw for checkout and normal operation of system.

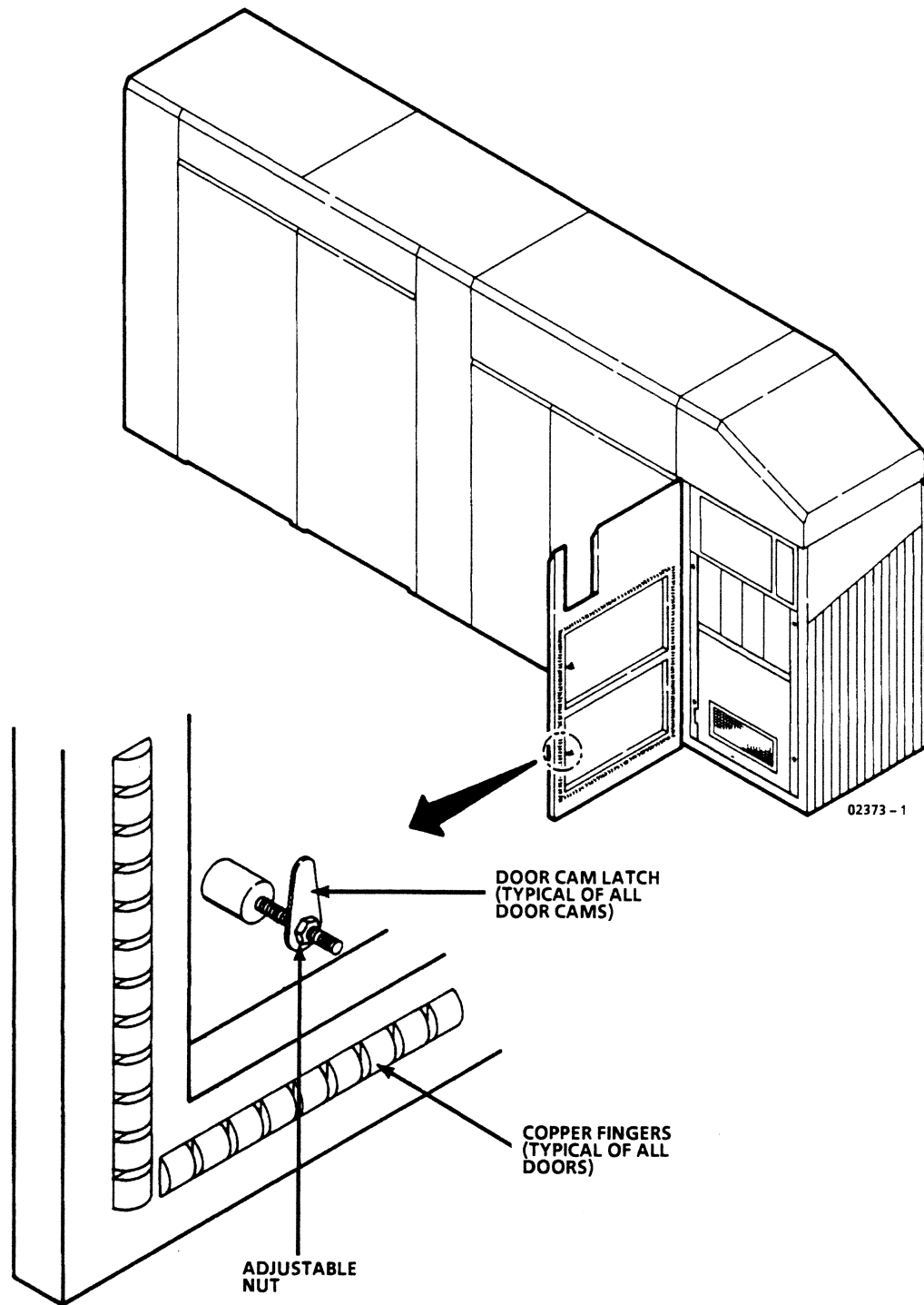


Figure 2-72. Typical EMI Door Seals

Optional CP-1 Installation

3

Removing System Power	3-4
Installing Bus Bars and Card Cage	3-8
Remove Airseal Cover and Brackets	3-9
Remove Temperature Sensors and Filler Plate	3-10
Remove Remote IOU Interface Module and Module Mounting Box	3-13
Install Bus Bar Mounting Brackets	3-17
Install Power and Ground Buses to Bus Bars	3-18
Position and Mount Bus Bars	3-22
Install Bus Bar Alignment Fixture	3-24
Tighten Bus Bars and Remove Alignment Fixture	3-26
Connect Power Sense Wires	3-28
Install CP-1 Regulator-to-Shunt Cable	3-30
Install Card Cage	3-32
Align Multipoint Connectors	3-34
Install Bus Bar Capacitors	3-40
Install Shunt and Connect Braided Bus Bar Straps	3-44
Install Bus Bar Temperature Sensor	3-46
Connect CP-1 Regulator Pak Cable	3-47
Connecting Logic Cables	3-48
Install Ribbon Cable Support Plate	3-48
Route and Connect SIB to IOU Cables	3-50
Install SIBB to SIBC and Interlock Cables	3-54
Installing CP Logic Modules and Regulator Paks	3-57
Install CP Modules	3-58
Install CP Regulator Pak	3-66
Install Air Seal Cover and Brackets	3-68
Applying Power	3-69
Apply Power	3-70
Adjust Power Unit Voltages	3-72

Optional CP-1 Installation

3

The following major tasks outline the optional CP-1 installation process for the CYBER 960 and 962 mainframes, when installed after the initial system installation. These tasks require two installers, and consist of individual procedures listed in sequential order. It is the installers' responsibility to select and perform only those steps applicable to the particular installation.

⚠ CAUTION

Only authorized factory personnel are allowed to perform the procedures in this chapter. Contact the local Control Data® site representative for further information.

In some installations, the order of these procedures may require changing. In such instances, the installers must have a thorough familiarization with the procedures, and the effect of the changes on the overall installation.

The installation process includes:

- Removing System Power
- Installing Bus Bars and Card Cage
- Connecting Cables
- Installing CP Logic Modules and Regulator Pak
- Applying Initial Power

Should any problems arise during the installation that cause excessive delays and are not readily resolvable through normal installation practices or through the use of maintenance manuals listed in the front of this manual, call your CYBER Hardware Support (CHS).

⚠ CAUTION

Check IOU(s) before beginning CP-1 installation. AT509B (location A23) or AT514A (location B21) must have a 1HRH module, p/n 41655803 or later installed.

⚠ CAUTION

The equipment installed in the following procedures may be damaged by electrostatic discharges. Installers must:

- Power down system before beginning installation procedures.
 - Wear antistatic smocks during the entire installation.
 - Always wear an antistatic wrist strap connected to frame ground when working on the mainframe with the doors opened.
 - Install or remove unit doors or panels as follows:
 1. Wear antistatic smock and wrist strap.
 2. Move door or panel near to installation location, if installing.
 3. Hold door or panel with one hand and connect ground wire from wrist strap to equipment frame ground with other hand.
 4. Install or remove door or panel on/from equipment.
-

Provide access to the CPU by removing doors and end panels as required. Door removal steps are not included in the procedures.

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Removing System Power

Use this procedure to set CPU circuit breakers and controls to proper positions before beginning installation.

- ___ 1. Set circuit breakers and controls at front of power unit (figure 3-1) as follows:
 - ___ a. Insert key (ships with power unit) in keyswitch on main control panel. Set switch to LOCAL MODE.
 - ___ b. NORMAL/DISABLE switch on main control panel to DISABLE.
 - ___ c. 120V 50/60 Hz CONTROL on AUX. BULK POWER SUPPLY to off (down).
 - ___ d. -2.0V POWER SUPPLY DISCONNECT to OFF.
 - ___ e. -2.0-V power supply ADJUST to fully ccw position.
 - ___ f. -4.5V POWER SUPPLY DISCONNECT to OFF.
 - ___ g. -4.5-V power supply ADJUST to fully ccw position.
 - ___ h. +5.0V POWER SUPPLY DISCONNECT to OFF.
 - ___ i. +5.0-V power supply ADJUST to fully ccw position.

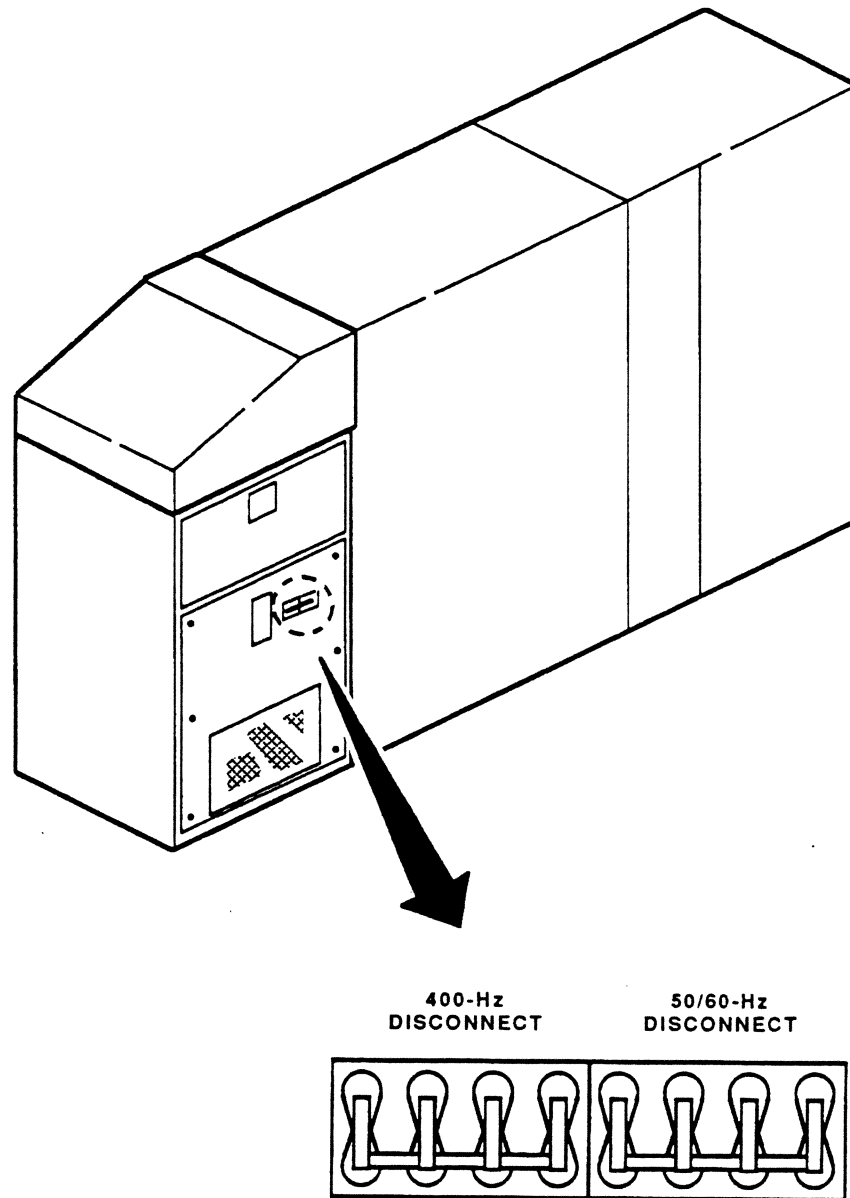
Optional CP-1 Installation 3-5

- ___ 2. Set power unit circuit breakers and controls at rear of power unit (figure 3-2) as follows:
 - ___ a. 50/60 Hz DISCONNECT to 0 (OFF).
 - ___ b. 400 Hz DISCONNECT to 0 (OFF).
- ___ 3. Set site 400-Hz circuit breakers to mainframe units to OFF.
- ___ 4. Set site 50/60-Hz circuit breakers to mainframe units to OFF.

⚠ CAUTION

Do not shut off an MG until all equipment connected to it has been powered down.

- ___ 5. Set site 50/60-Hz circuit breakers to MG set and MG interface unit to OFF.



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Figure 3-2. Power Unit Rear Controls

Installing Bus Bars and Card Cage

The following procedures describe the CP-1 bus bar and card cage installation. The bus bars are installed before the card cage.

- Remove Airseal Cover and Brackets
- Remove Temperature Sensors and Filler Plate
- Remove Remote IOU Interface Module and Module Mounting Box
- Install Bus Bar Mounting Brackets
- Install Power and Ground Buses to Bus Bars
- Position and Mount Bus Bars
- Install Bus Bar Alignment Fixture
- Tighten Bus Bars and Remove Alignment Fixture
- Connect Power Sense Wires
- Install CP-1 Regulator-to-Shunt Cable
- Install Card Cage
- Align Multipoint Connectors
- Install Bus Bar Capacitors
- Install Shunt and Connect Braided Bus Bar Straps
- Install Bus Bar Temperature Sensor
- Connect CP-1 Regulator Pak Cable

Remove Airseal Cover and Brackets

Use this procedure to remove the airseal cover from the rear of the CP cabinet, and to remove the brackets to which the airseal cover is mounted.

- 1. Turn airseal cover retaining fasteners (figure 3-3) 1/4-turn counterclockwise to loosen
- 2. Remove airseal cover.
- 3. Remove screws from top, bottom, and left airseal brackets, then remove brackets.

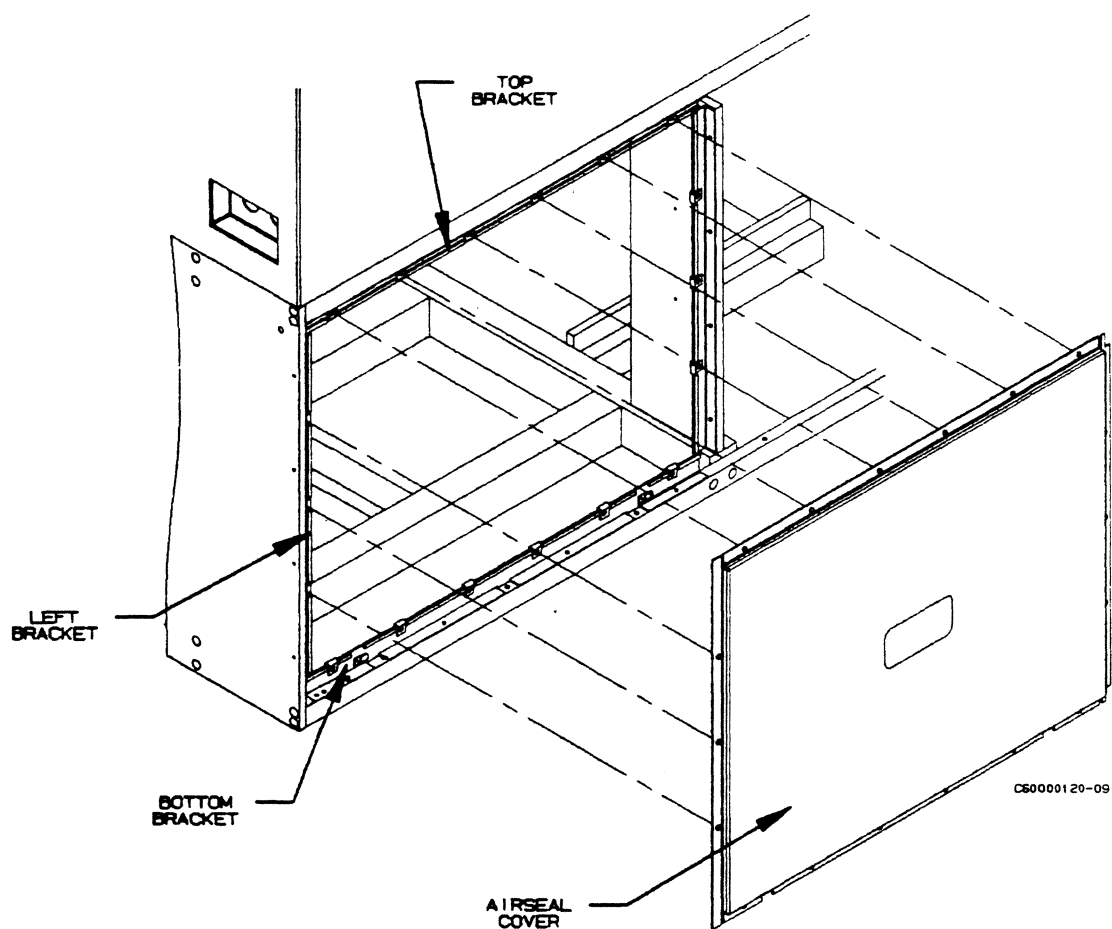


Figure 3-3. Airseal Cover and Mounting Brackets

Remove Temperature Sensors and Filler Plate

Use this procedure to remove the temperature sensors mounted to the filler plate, and to remove the filler plate.

- 1. Cut and discard cable ties holding temperature sensor wires to filler plate (figure 3-4).
- 2. Remove screws holding temperature sensor brackets and lay temperature sensors behind CP-0. Do not disconnect wires.

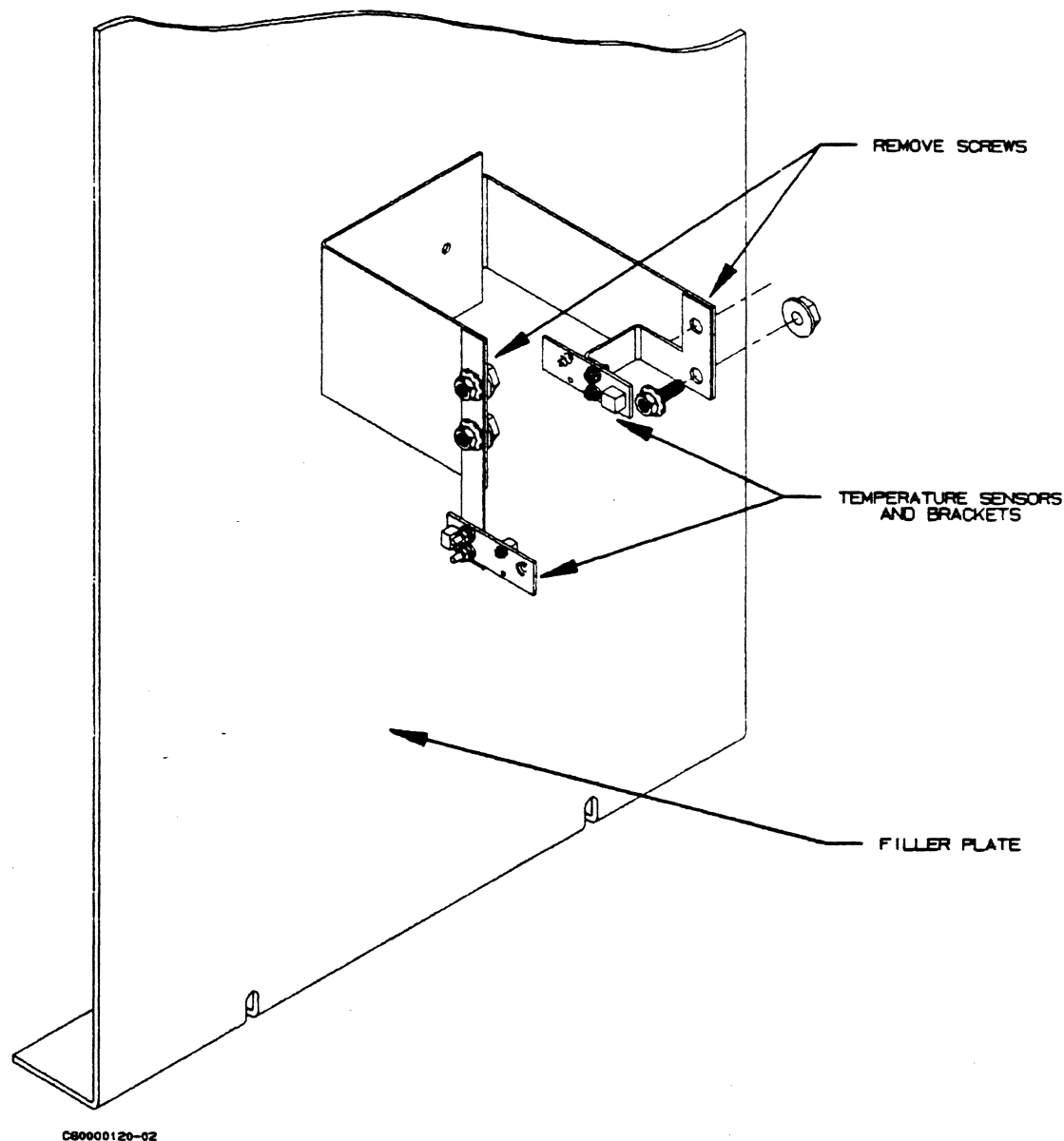
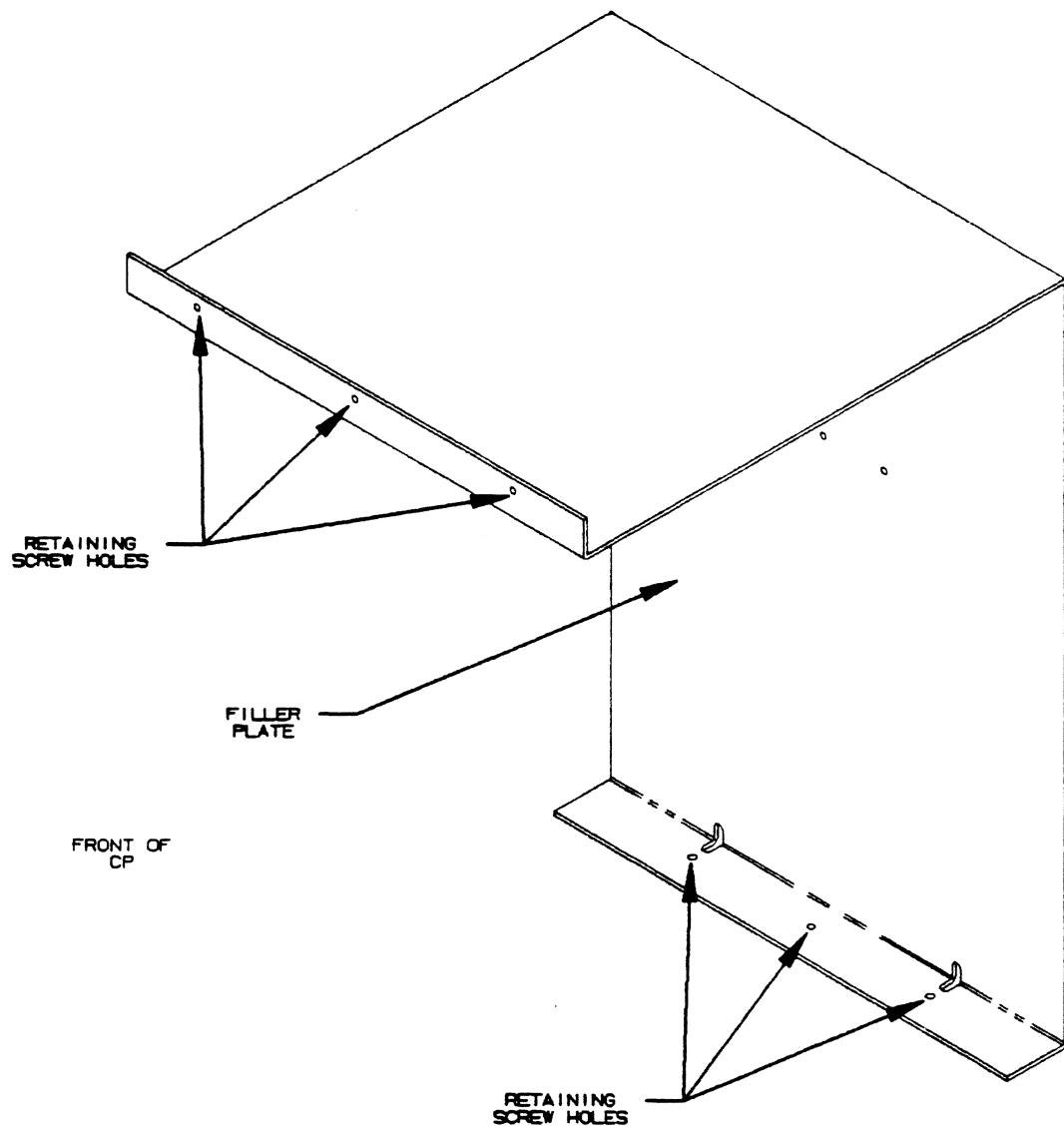


Figure 3-4. Temperature Sensor Mounting

- ___ 3. Remove filler plate according to the applicable substep:
 - ___ a. If standalone IOU is not present, remove filler plate retaining screws and filler plate as shown in figure 3-5.



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Figure 3-5. Filler Plate Removal

- b. If standalone IOU is present, remove filler plate retaining screws and filler plate from Remote IOU Interface Module mounting box as shown in figure 3-6.

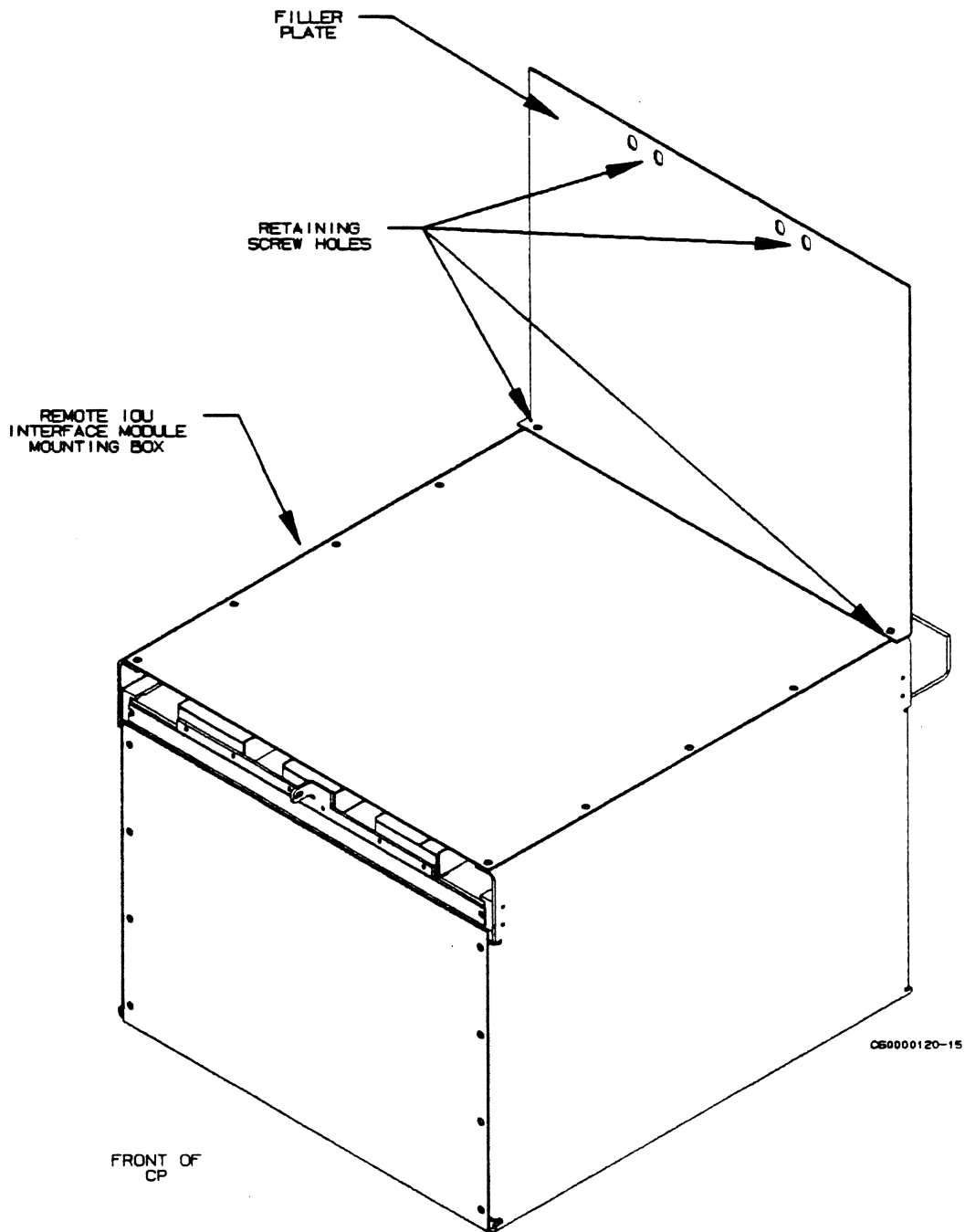


Figure 3-6. Filler Plate Removal

Remove Remote IOU Interface Module and Module Mounting Box

Use the following procedure to remove the Remote IOU Interface Module and its mounting box from the CP. The module and mounting box will be present only on systems with a standalone IOU.

- 1. Remove front cover plate from Remote IOU Interface Module mounting box (figure 3-7).
- 2. Remove two screws holding module in box.
- 3. Pull Remote IOU Interface Module out from module mounting box, ensuring that attached cables don't snag.
- 4. Hold module upright. Unplug cables from module and lay cables in bottom of CP.
- 5. Place Module in antistatic bag and set aside for later installation.

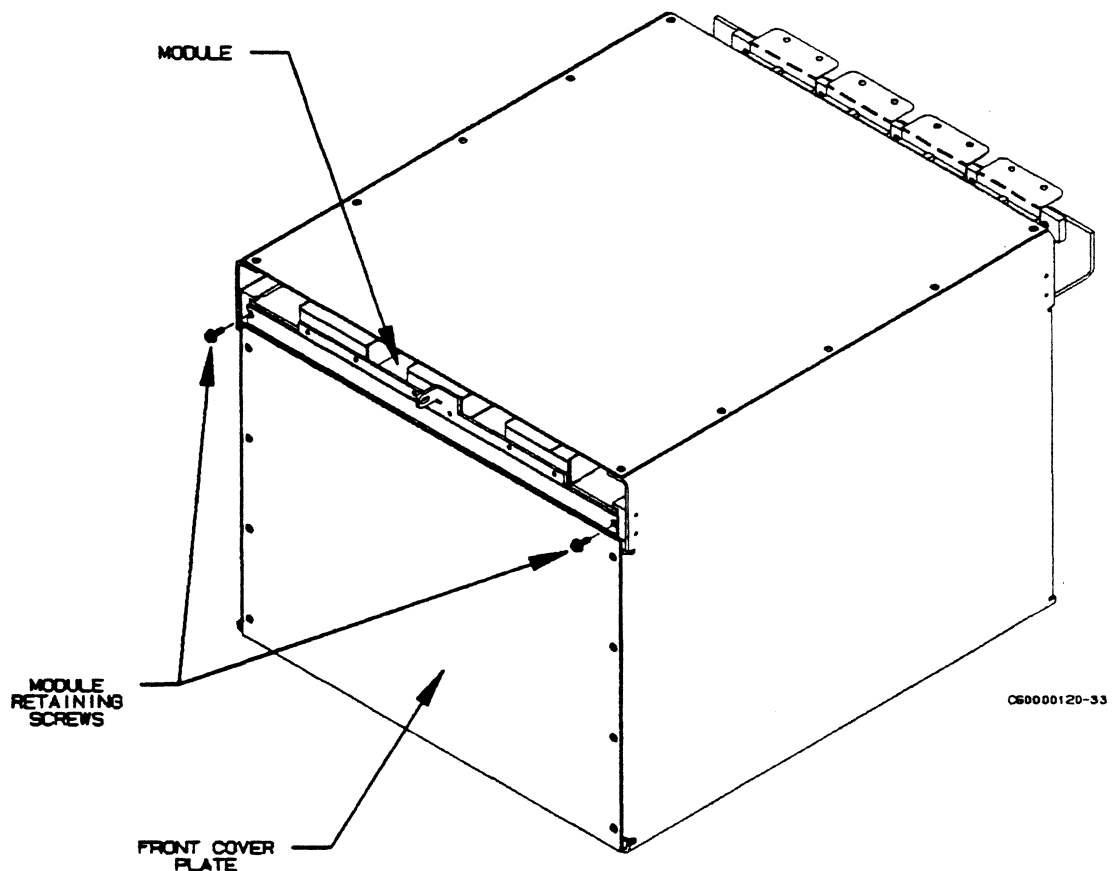


Figure 3-7. Remote IOU Interface Module Mounting Box

- 6. Remove power bus wires between mounting box and CP-0 bus bars from CP-0 bus bars (figure 3-8).

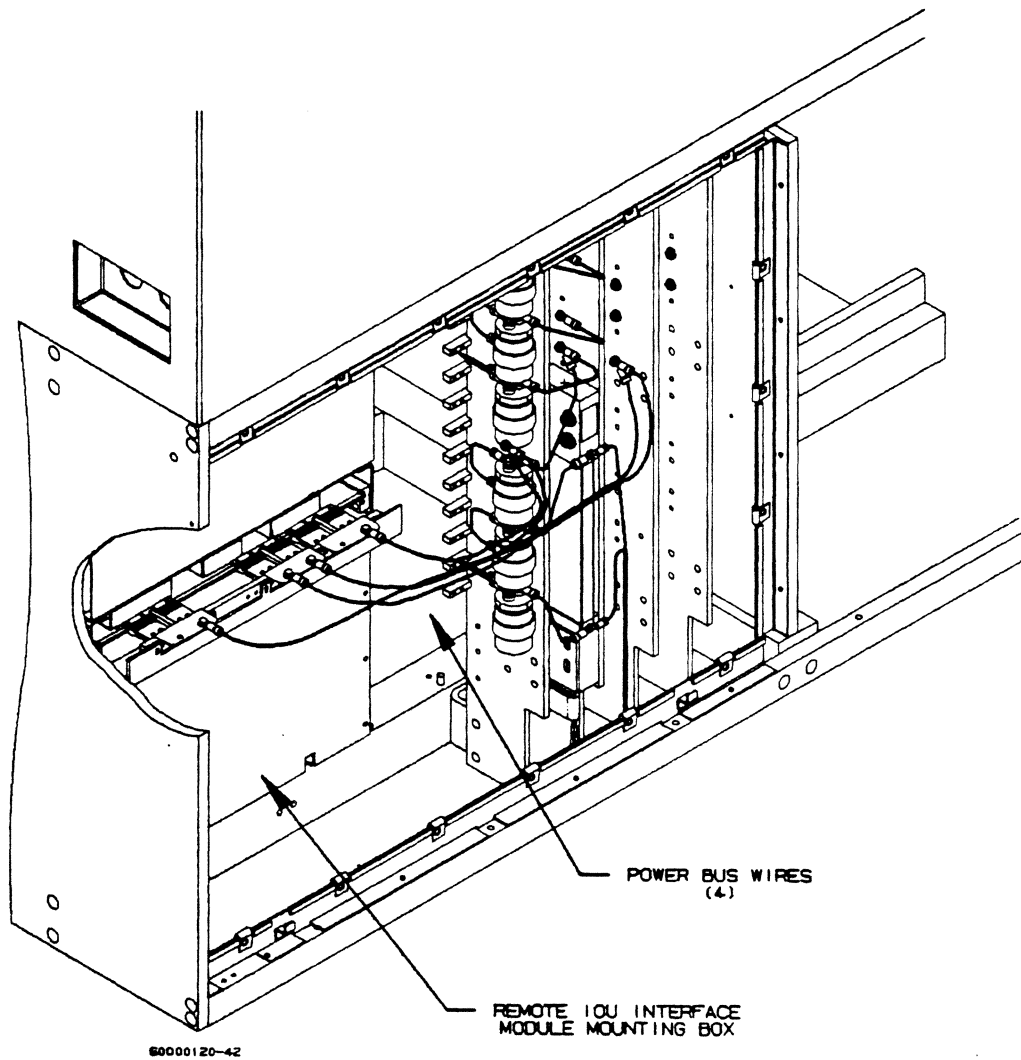


Figure 3-8. Mounting Box Bus Wire Connections

- ___ 7. Remove module box mounting screws (figure 3-9). Pull box out front of CP.

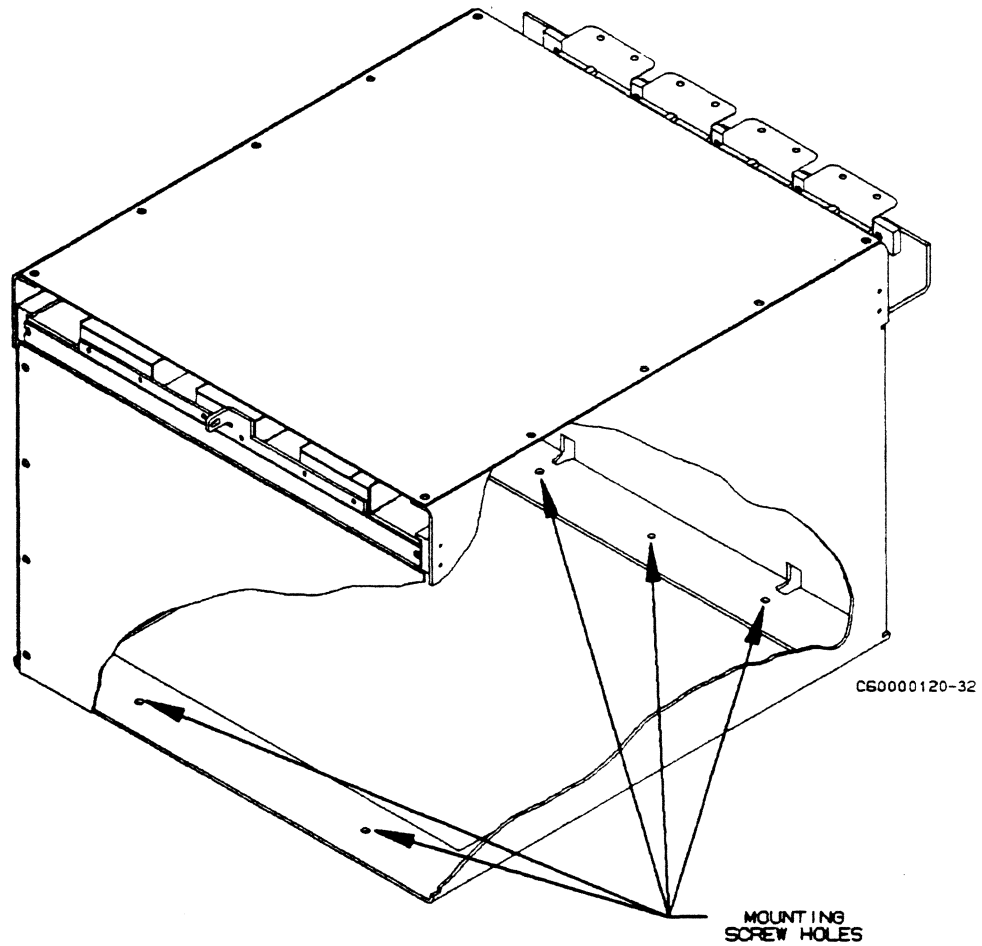


Figure 3-9. Mounting Box Mounting Screws

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Install Bus Bar Mounting Brackets

Use this procedure to install the bus bar "U" brackets.

- 1. Locate installation kit #CP1-1.
- 2. Loosely attach four bus bar mounting "U" brackets (figure 3-10) using hardware in kit #CP1-1. Do not tighten at this time.

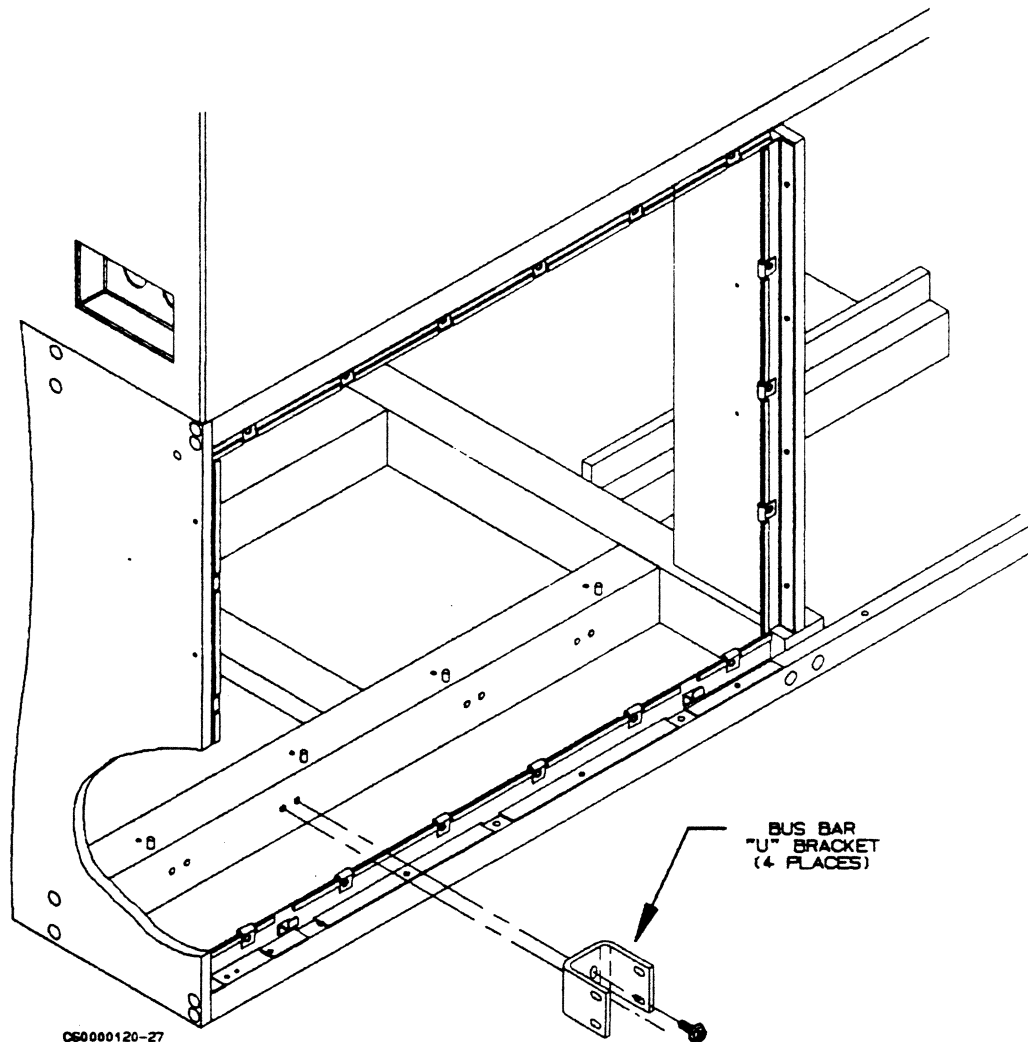


Figure 3-10. Mounting Brackets

Install Power and Ground Buses to Bus Bars

Use this procedure to install the power and ground buses to the CP-1 bus bars:

- ___ 1. Remove top and bottom multipoint connectors from each of four bus bars. Set connectors and mounting hardware aside, taking care not to damage them.
- ___ 2. Locate installation kits #CP1-2 (WV1), #CP1-3 (WV2), #CP1-4 (WV3), and #CP1-5 (WV4).

NOTE

All four bus bars are identical when they are removed from the options installation kit. Bus bars are shown without multipoint connectors for clarity.

- ___ 3. Label one bus bar WV1, another WV2, a third WV3, and one WV4.

WARNING

Do not come in direct contact with electrical grease. It may irritate the skin and is harmful if swallowed.

- ___ 4. Put on protective stretch gloves (supplied with system installation kit).

CAUTION

Be careful when cleaning contact areas with Scotch Brite, as it is very abrasive. Don't rub hard, or you'll remove the plating.

- ___ 5. Lightly clean contact areas of power and ground buses and bus bars with Scotch Brite and apply light coating of EJC #2.
- ___ 6. Install vertical bracket isolators on WV2 and WV3, carefully noting correct orientation. Isolators have adhesive backing.
- ___ 7. Install buses on bus bars according to the applicable substep.
 - ___ a. If Remote IOU is not present, install power and ground buses as shown in figure 3-11. Note which mounting holes are used, as well as difference in WV4 ground bus. Torque mounting screws to 2 N·m (18 lbf·in).

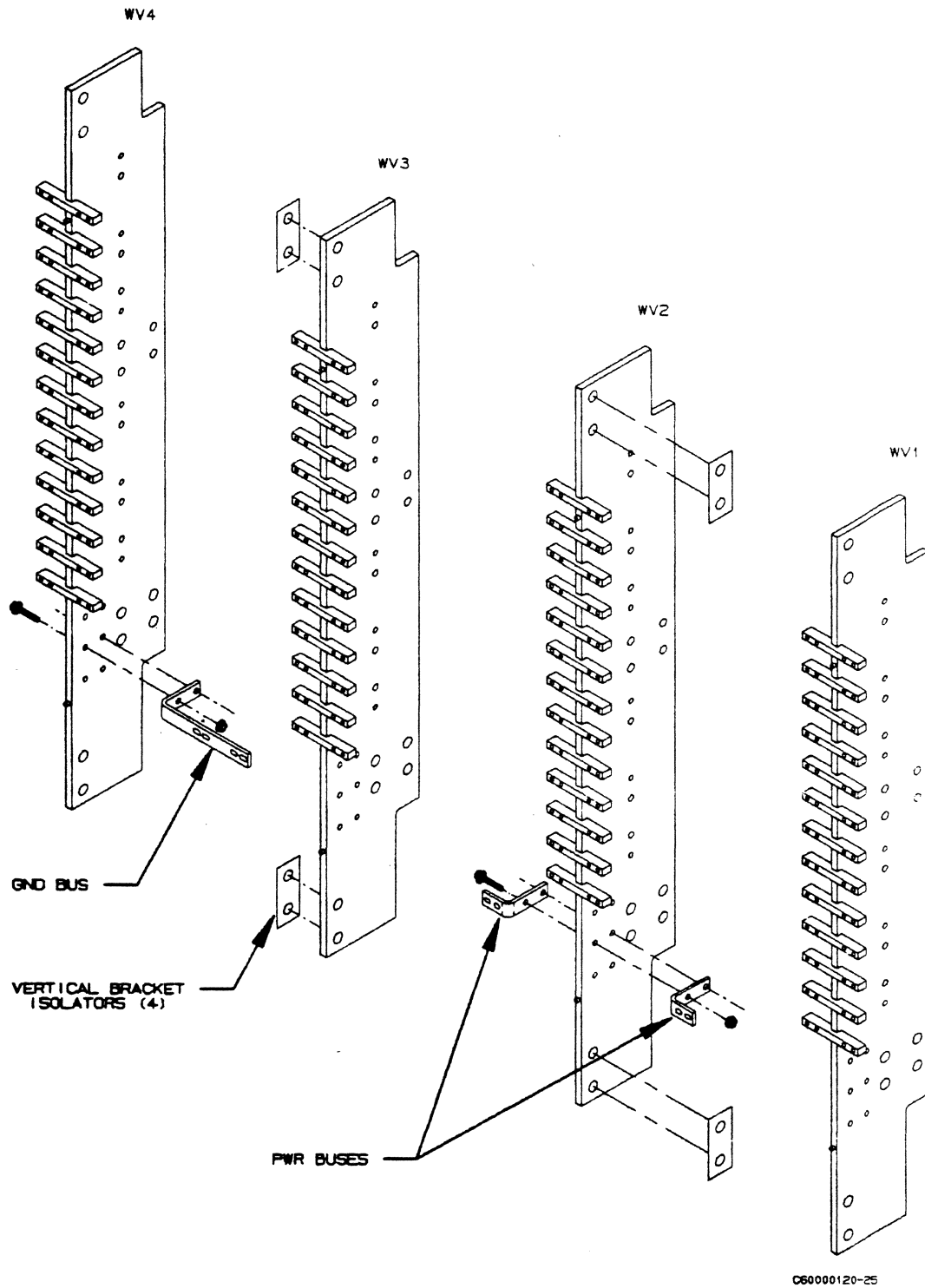


Figure 3-11. Bus Bar Preparation

- b. If Remote IOU is present, install power and ground buses as shown in figure 3-12. Note which mounting holes are used, as well as difference in one WV4 ground bus. Torque mounting screws to 2 N·m (18 lbf·in).

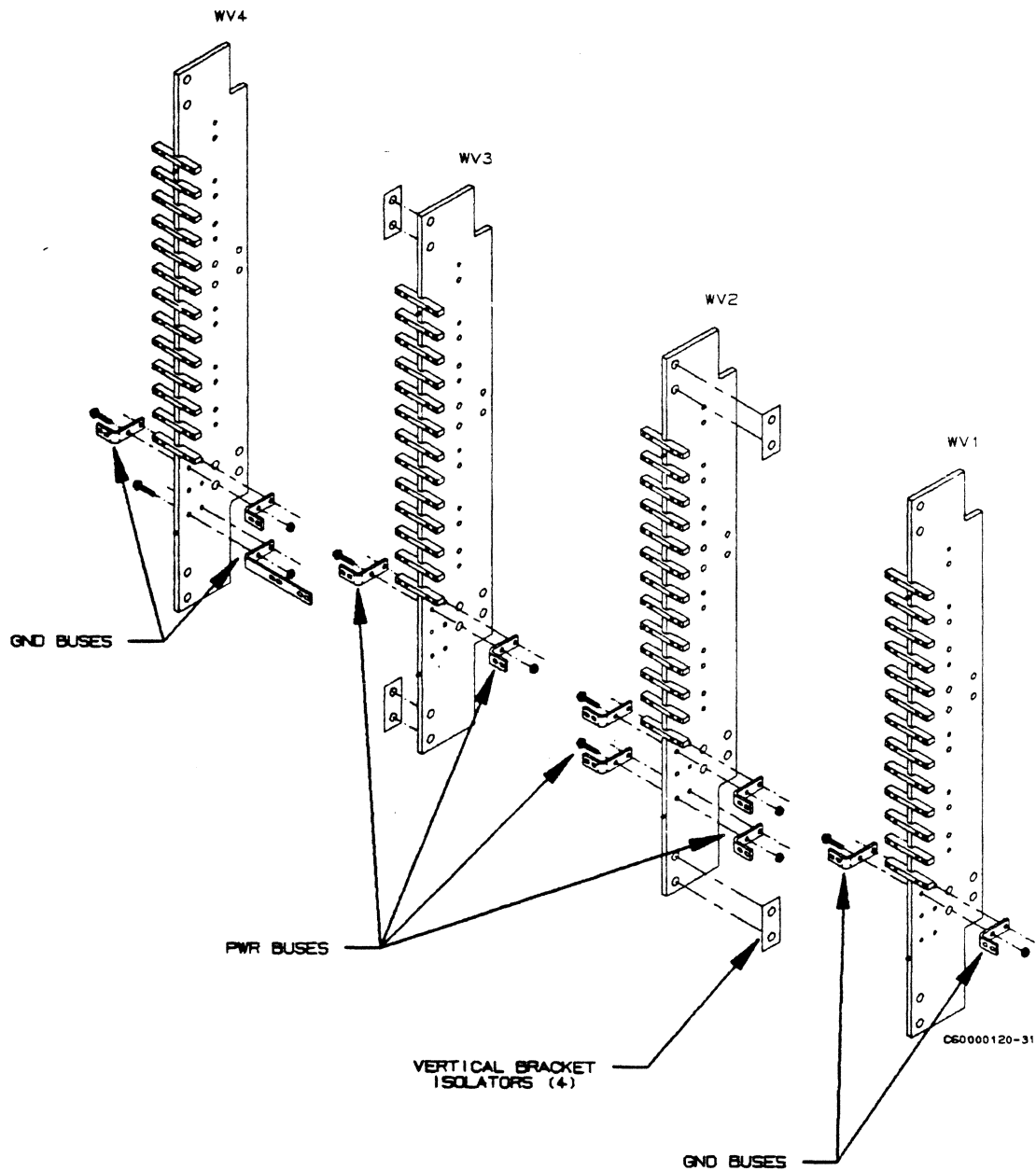


Figure 3-12. Bus Bar Preparation

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Position and Mount Bus Bars

Use this procedure to place bus bars into position in CP-1.

⚠ WARNING

Do not come in direct contact with electrical grease. It may irritate the skin and is harmful if swallowed.

- ___ 1. Locate installation kit #CP1-6.
- ___ 2. Put on protective stretch gloves (supplied with system installation kit).

⚠ CAUTION

Be careful when cleaning contact areas with Scotch Brite, as it is very abrasive. Don't rub hard, or you'll remove the plating.

- ___ 3. Remove tubing from braided bus bar straps and lightly clean contact surfaces with Scotch Brite. Apply light coating of EJC #2.

NOTE

The following step requires two persons.

- ___ 4. Hold bus bars in position while installing isolation bushings, nuts, bolts, and washers in top and bottom of each bus bar (figure 3-13). Note location of isolation bushings. Do not tighten.
- ___ 5. Do not install mounting hardware between bus bars and braided bus bar straps. They will be installed in a later procedure.

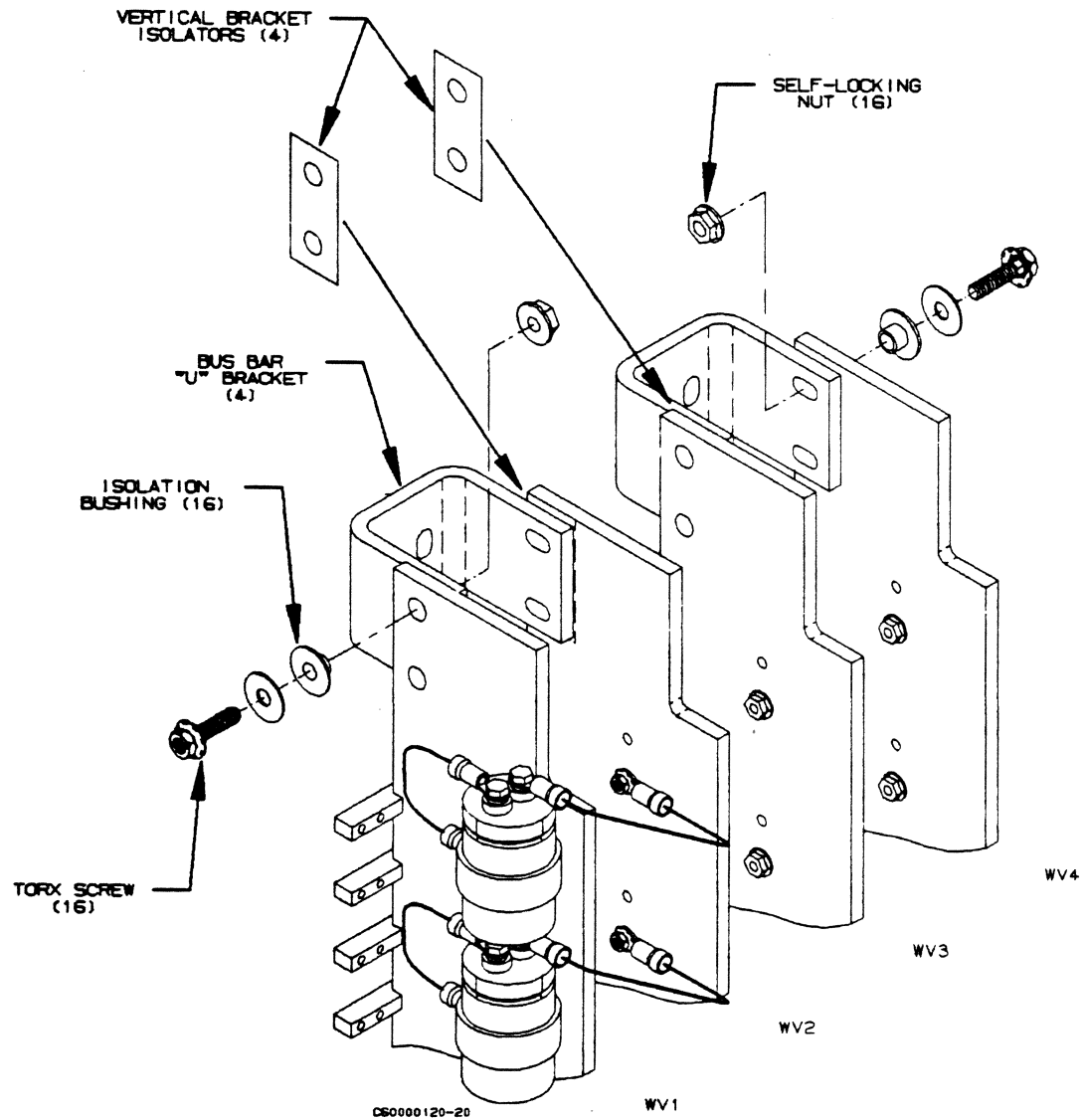


Figure 3-13. Bus Bar Positioning and Mounting

Install Bus Bar Alignment Fixture

Use this procedure to install the bus bar alignment fixture.

NOTE

The following steps require two persons.

- ___ 1. Locate installation kit #CP1-7 (attached to alignment fixture).
- ___ 2. Locate retaining screws from kit #CP1- 7 and slide bus bar alignment fixture into CP.
- ___ 3. Pull back on bus bars while pushing on alignment fixture until fixture seats on guide pins in base (figure 3-14).
- ___ 4. Insert and tighten alignment fixture retaining screws, two in front, two in back.

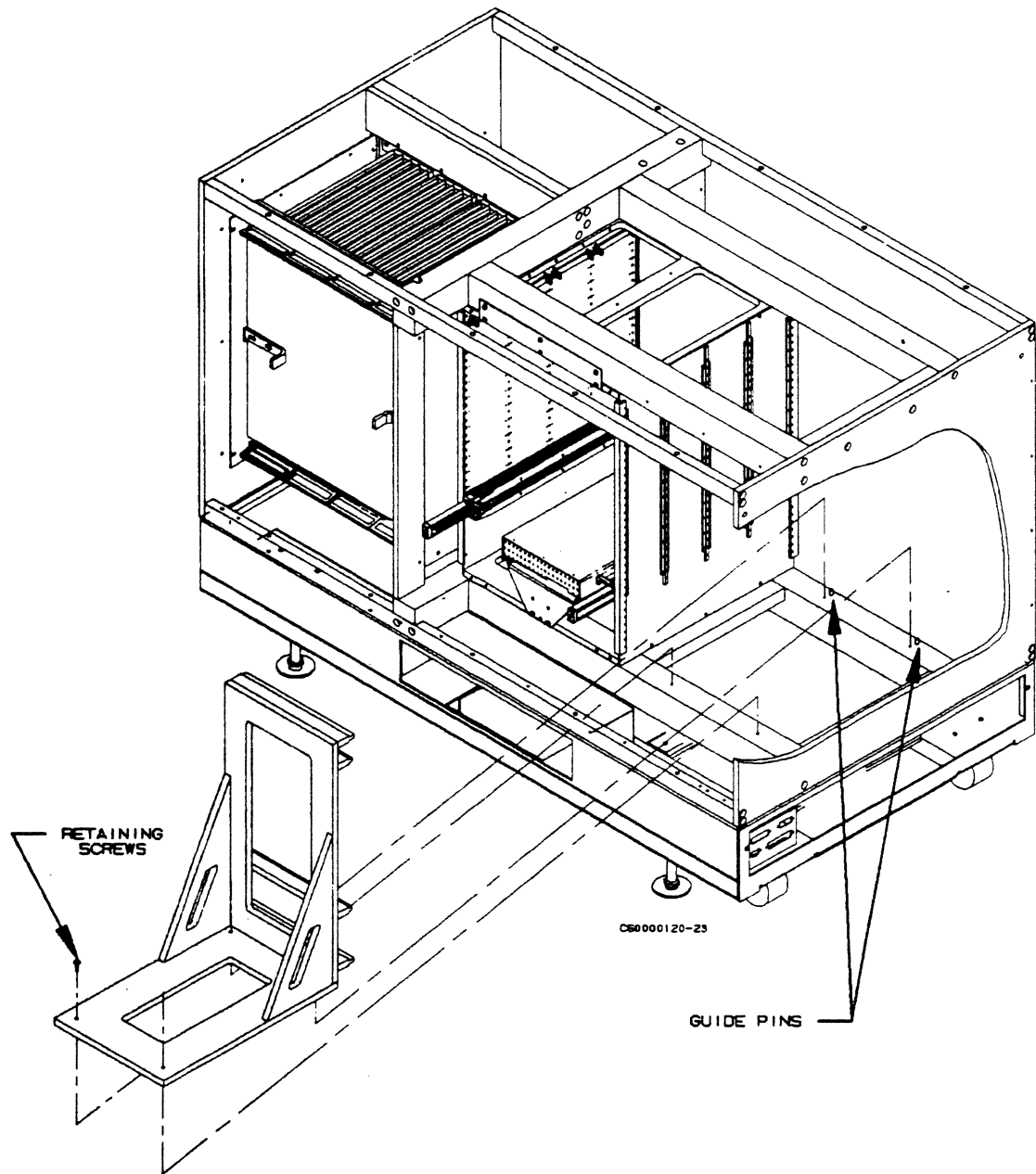


Figure 3-14. Bus Bar Alignment Fixture

Tighten Bus Bars and Remove Alignment Fixture

Use this procedure to tighten the bus bars in place and to remove the bus bar alignment fixture after tightening.

NOTE

The following steps require two persons.

- ___ 1. Lift up on WV1 from rear of CP-1. Push up and against alignment fixture until alignment pins at top and bottom of bus bars pop into mating holes in fixture (figure 3-15).
- ___ 2. Tighten screws only enough to remove slack. Do not fully tighten at this time.
- ___ 3. Repeat previous steps with WV2 through WV4.
- ___ 4. Tighten all bolts to 5.6 N·m (50 lbf·in) and in following order.
 - ___ a. Tighten bolts holding WV2 to "U" brackets.
 - ___ b. Tighten WV1/WV2 "U" brackets to superstructure.
 - ___ c. Tighten WV1 to "U" brackets.
 - ___ d. Tighten bolts holding WV3 to "U" brackets.
 - ___ e. Tighten WV3/WV4 "U" brackets to superstructure.
 - ___ f. Tighten WV4 to "U" brackets.

WARNING

Be very careful when removing alignment fixture, as it is under tension and may be difficult to remove. If it is necessary to jerk fixture to loosen it for removal, ensure that the SIBs are not damaged.

- ___ 5. Remove alignment fixture.

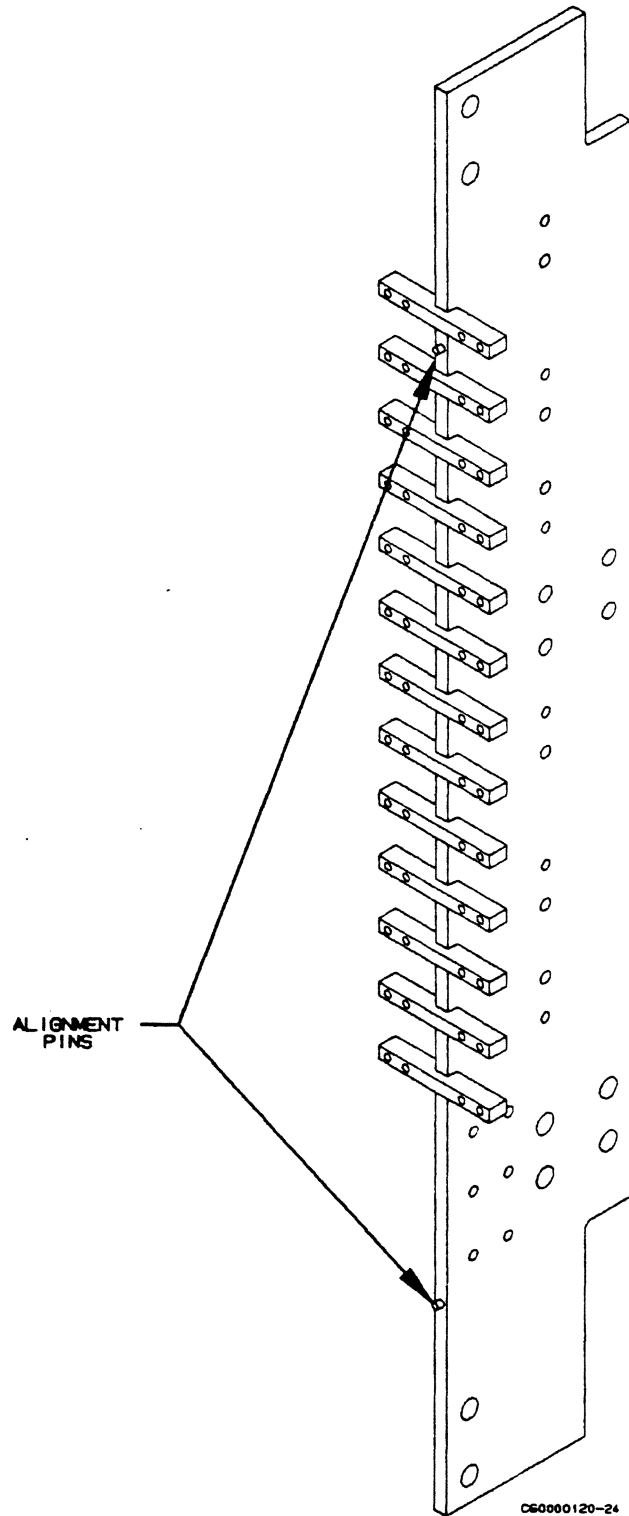


Figure 3-15. Bus Bar Alignment

Connect Power Sense Wires

Use this procedure to connect two unused power sense wires to the bus bar straps.

- ___ 1. Locate installation kit #CP1-8.
- ___ 2. Locate WV3+ and WV3- wires (bolted together) in bottom right rear of CP unit (figure 3-16).
- ___ 3. Remove heatshrink tubing from wires. Remove nut and bolt holding wires together. Discard nut and bolt.
- ___ 4. Untwist wires and pull WV3- (black) wire back between aluminum frame member and foam air seal in base. Connect to WV3 bus bar and torque to 1.2 N·m (10.8 lbf-in).
- ___ 5. Connect WV3+ (white) to pad above strap on WV3 bus. Torque to 1.2 N·m (10.8 lbf-in).

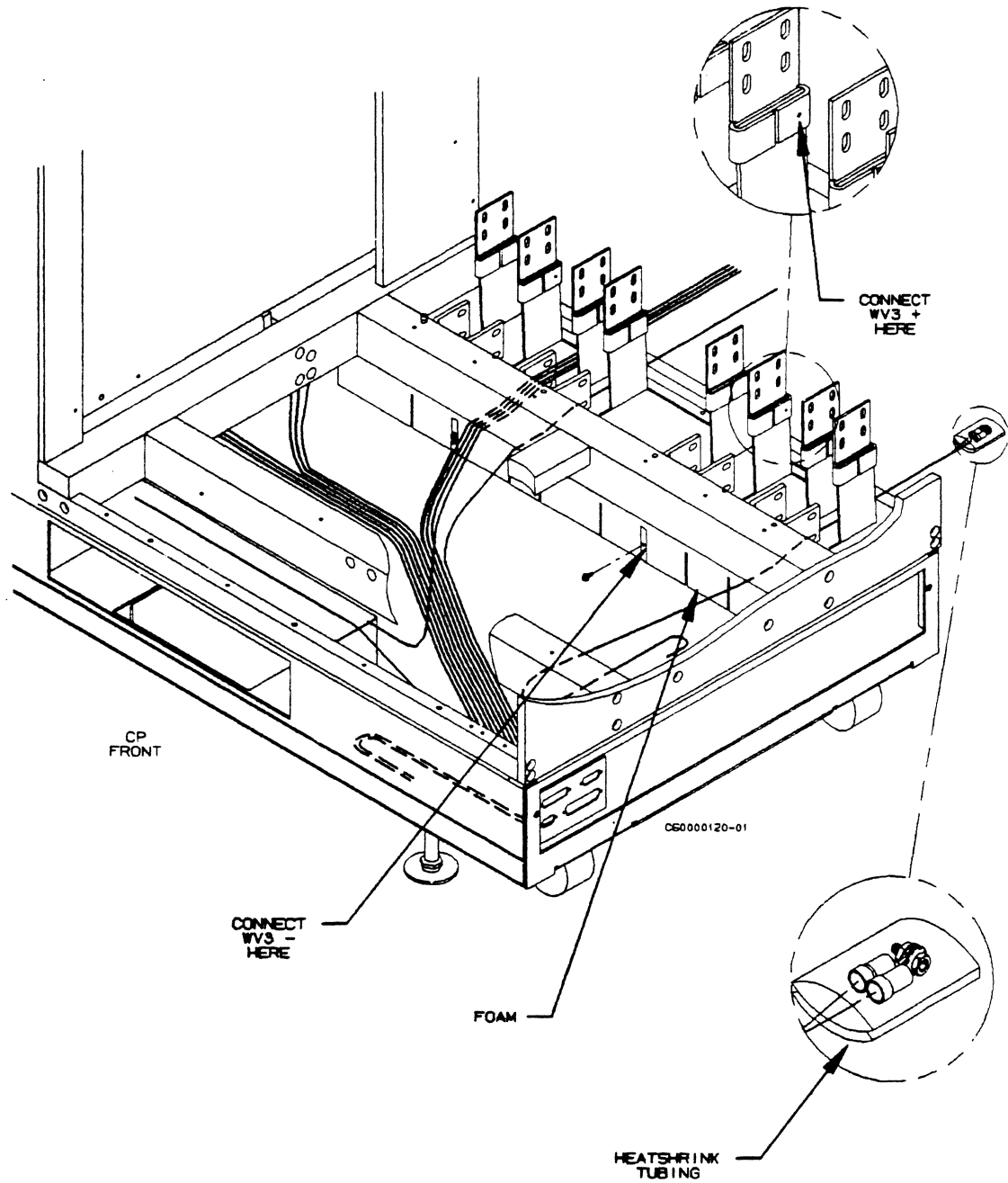


Figure 3-16. Power Sense Wire Location

Install CP-1 Regulator-to-Shunt Cable

Use this procedure to route the cable that will connect CP-1 Regulator Pak and CP-1 shunt.

- ___ 1. Locate Regulator-to-Shunt cable in installation kit CP1-8.
- ___ 2. Push lugged end of cable (marked SH+ and SH-) between aluminum frame member and foam air seal in base. Position lugged end near WV2 (figure 3-17).
- ___ 3. Position connector end (marked P1) in bottom of CP cabinet near center of CP-1 location. Connector will be plugged into CP-1 Regulator Pak in a later procedure.

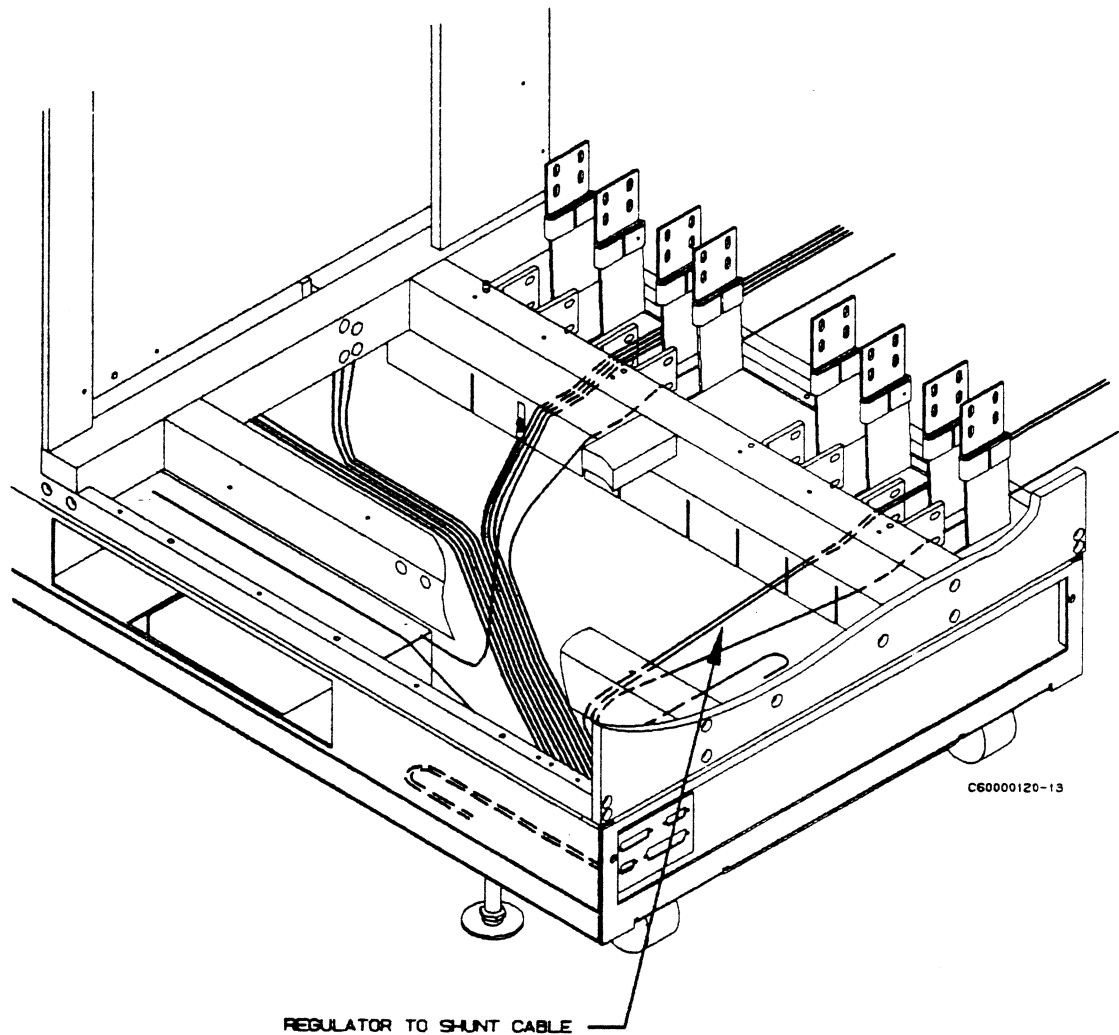


Figure 3-17. Regulator-to-Shunt Cable Location

Install Card Cage

The following procedure describes installing the CP-1 card cage.

- ___ 1. Locate installation kit #CP1-9.
- ___ 2. Install pressure-sensitive tape to side of SIBC as shown in figure 3-18.
- ___ 3. Set CP-1 cage into CP cabinet and push back until cage seats against guide pins in rear of cabinet.

CAUTION

When pushing CP-1 cage into CP cabinet, watch out for small wires soldered to SIBC and SIBD. These wires can catch on protrusions in CP cabinet and break off without the installer being aware of it.

- ___ 4. Hold cage against pins and insert screws, three 8-32 x 3/8-in in top edge, and five 8-32 x 1-in in bottom.
- ___ 5. Remove shipping brackets from CP-1 cage and set aside.

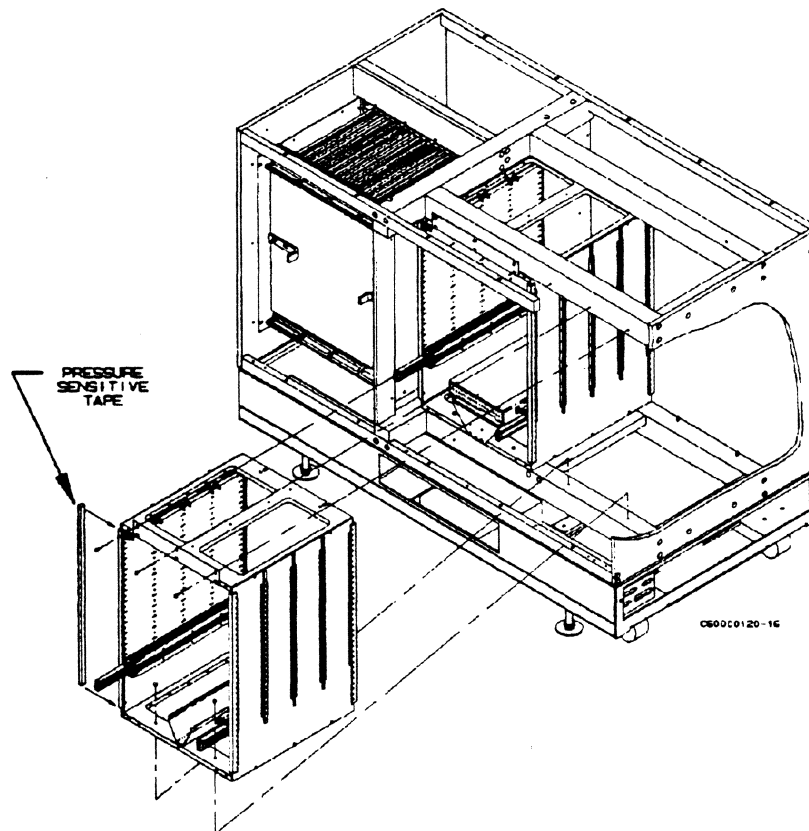


Figure 3-18. CP-1 Cage Mounting

- 6. Attach SIBC and SIBD decals to front of blower box (figure 3-19).

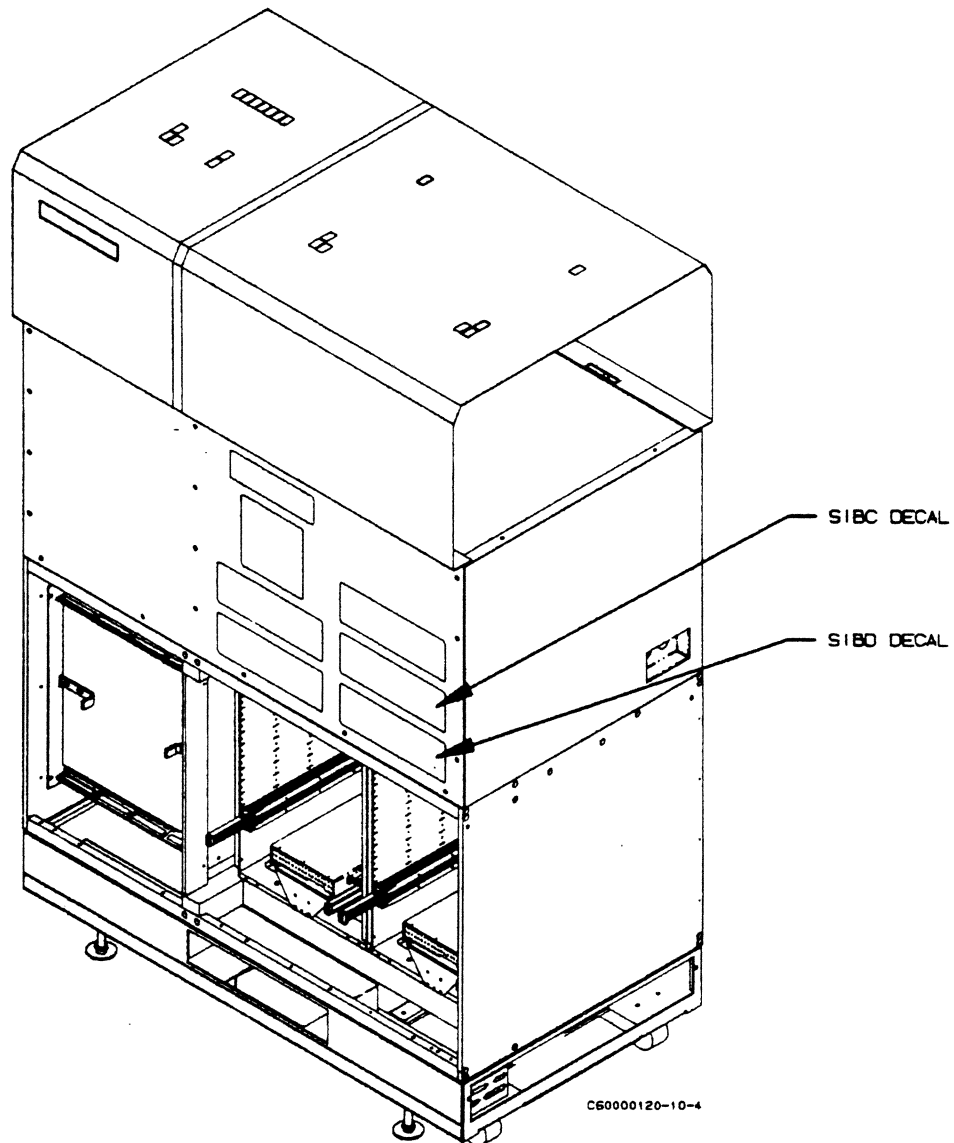


Figure 3-19. SIBC and SIBD Decal Location

Align Multipoint Connectors

Use this procedure to align the CP-1 multipoint connectors.

- ___ 1. Install multipoint connectors removed in an earlier step. Do not tighten.

NOTE

The following steps require two persons.

- ___ 2. Loosen mounting screws for four multipoint connectors in top module location.
- ___ 3. Carefully slide multipoint connector alignment gauge into top module slot, ensuring connectors are not damaged (figure 3-20).
- ___ 4. Tighten mounting screws for each connector to 0.56 N·m (5 lbf·in) for all connectors in slot. Tighten each connector's two inner screws first, then two outer screws.
- ___ 5. Repeat above three steps for all remaining CP-1 modules.

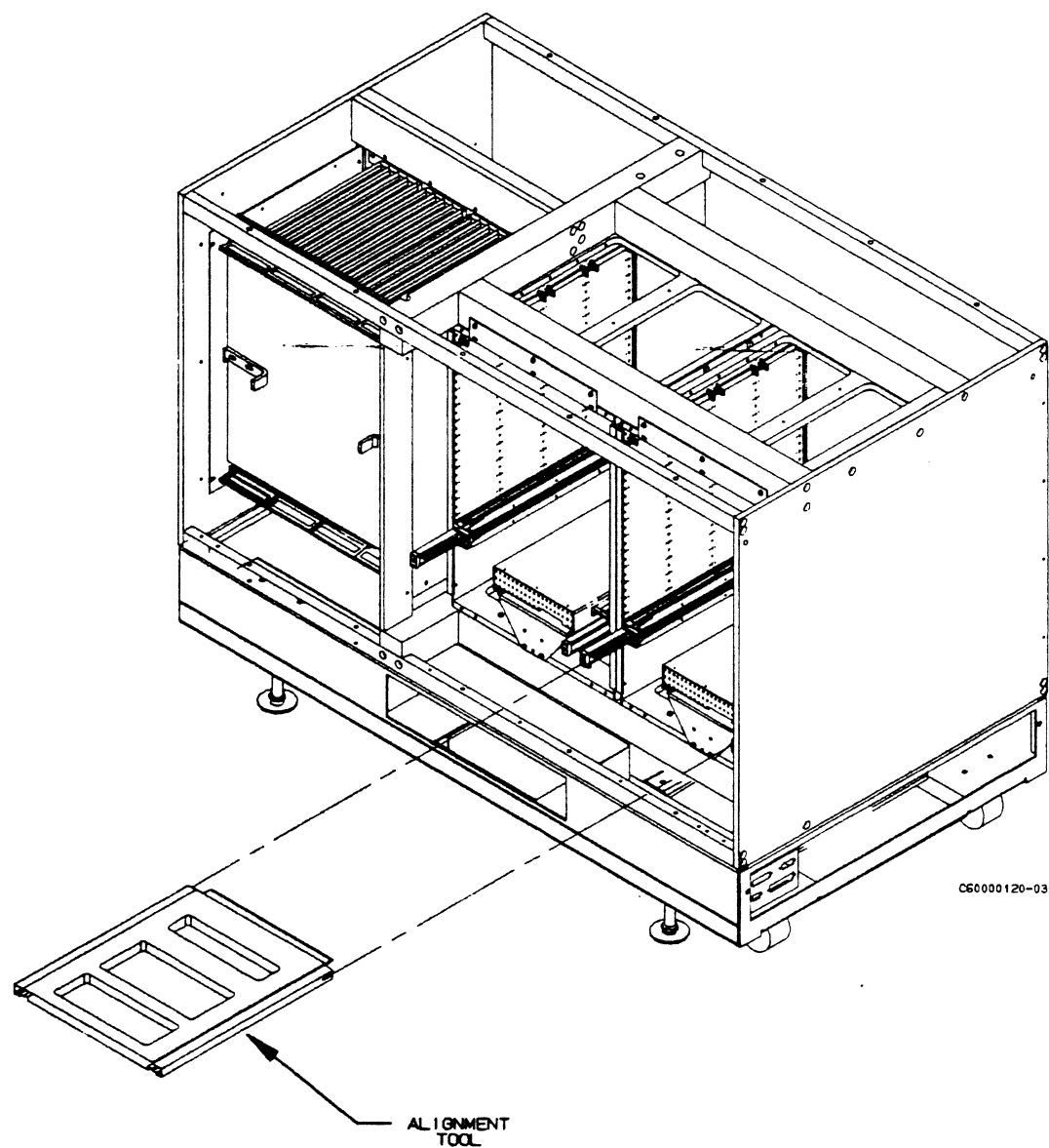


Figure 3-20. Multipoint Connector Alignment

NOTE

Multipoint connectors are in installation kits CP1-3 (WV2) and CP1-5 (WV4).

- ___ 6. Loosely install CP-1 Regulator Pak multipoint connectors to power and ground buses on WV2 and WV4 (figure 3-21). Install WV4 ground bus insulator on back side of bus, between bus and WV3.
- ___ 7. Temporarily install CP-1 Regulator Pak. Use Regulator Pak to align its multipoint connectors. Remove Pak and Channel when connectors have been aligned.
- ___ 8. If Remote IOU is not present, skip to next procedure. Otherwise, continue with this procedure.

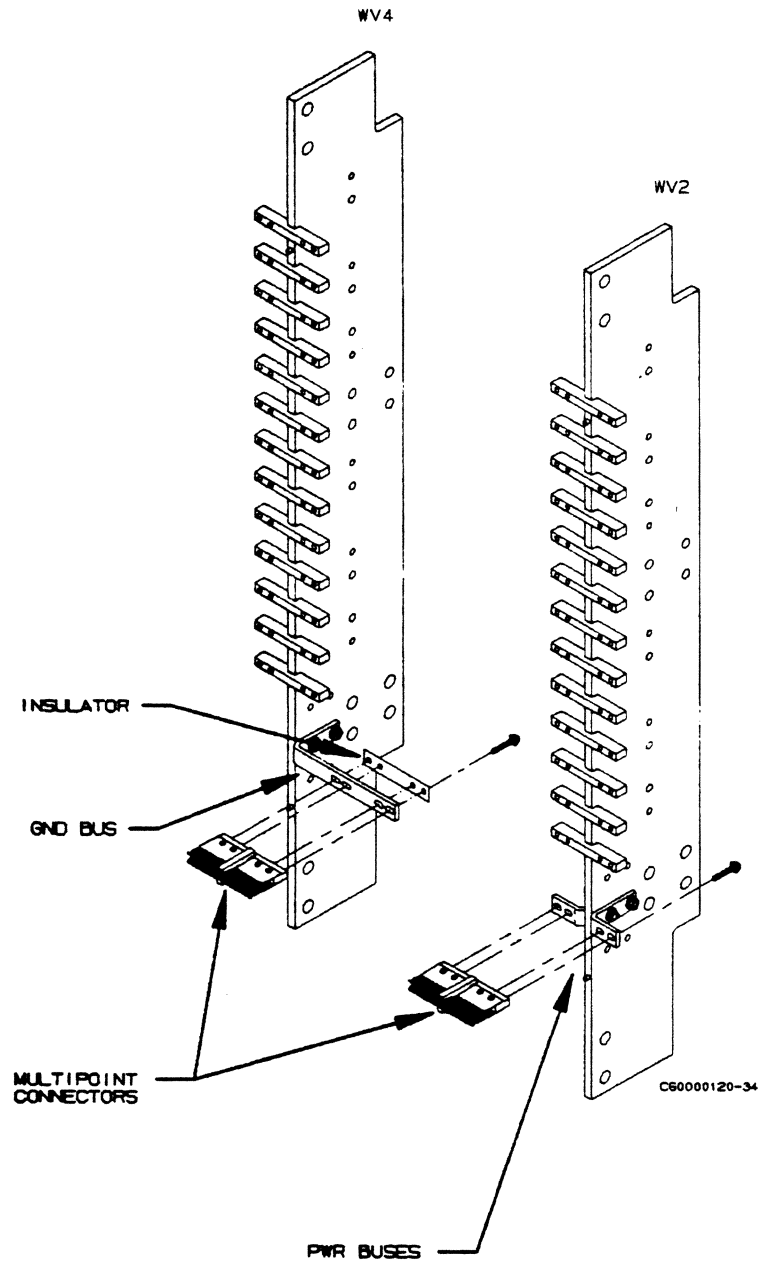


Figure 3-21. Ground and Power Bus Multipoint Connector Installation

- 9. If Remote IOU is present, loosely install a full row of multipoint connectors on power and ground buses that were installed in an earlier procedure (figure 3-22). Multipoint connectors are supplied in kits #CP1-2 through CP1-5.
- 10. Install Remote IOU Interface Module (if present) in lowest row with multipoint connectors on all four bus bars. Use module to align its multipoint connectors, then tighten connectors. Remove module when done and return to antistatic container.

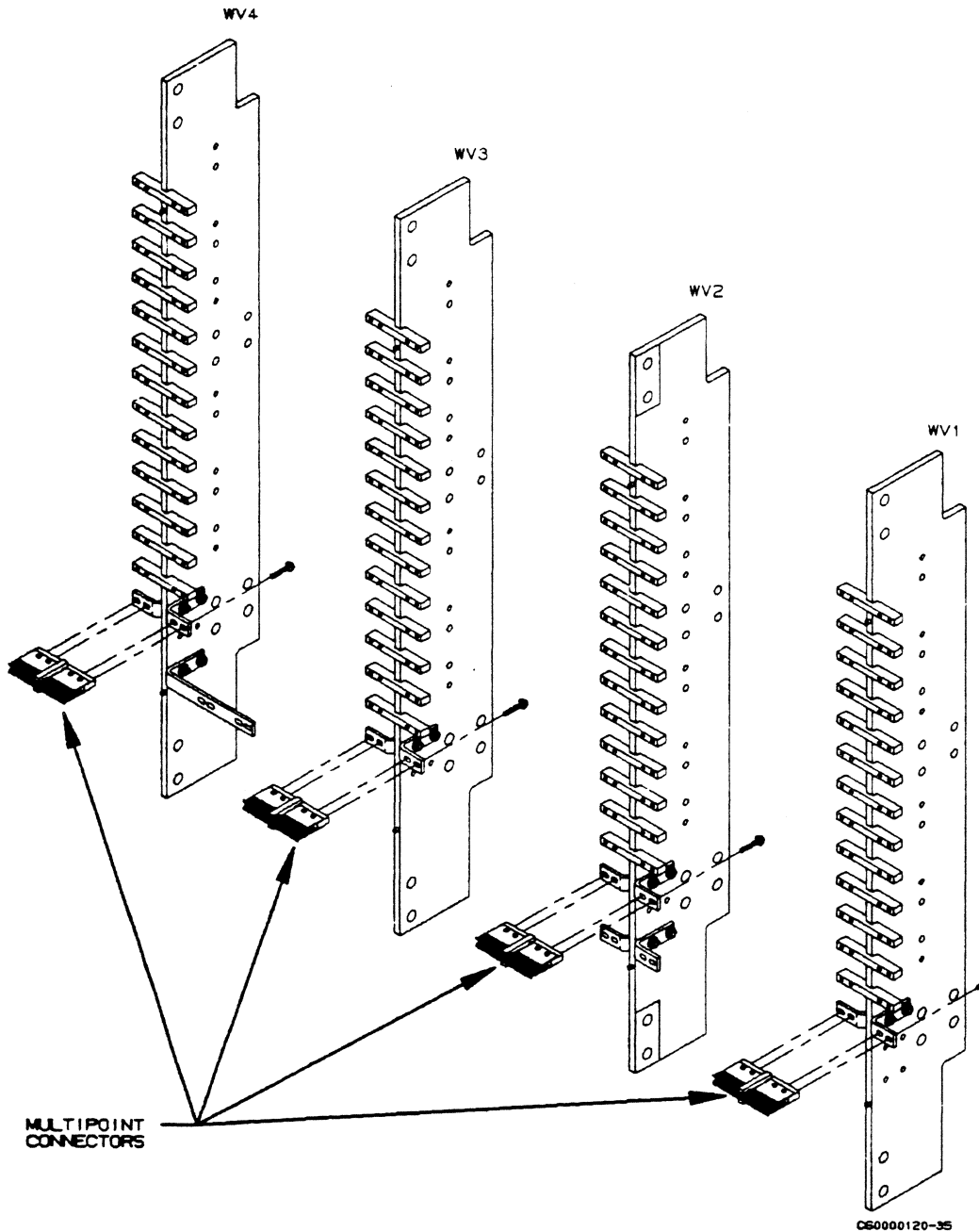


Figure 3-22. Multipoint Connector Installation

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Install Bus Bar Capacitors

Use this procedure to install the CP-1 regulating capacitors.

- ___ 1. Locate installation kits #CP1-10 (WV1) and #CP1-11 (WV4).
- ___ 2. Locate nine capacitors. Note that three are marked WV4, while six are not marked.
- ___ 3. Place clamps around all capacitors, and insert mounting screws into painted holes.
- ___ 4. Attach six unmarked capacitors to side of WV1 as shown in figure 3-23. Torque screws to 1.9 N·m (17 lbf·in).
- ___ 5. Fasten black wire from each capacitor to unpainted (epoxy-free) hole adjacent to capacitors. Torque screws to 1.9 N·m (17 lbf·in).
- ___ 6. Fasten blue wires from top four capacitors to unpainted holes on WV2. Torque screws to 1.9 N·m (17 lbf·in). Do not install blue wires from two lowest capacitors at this time.

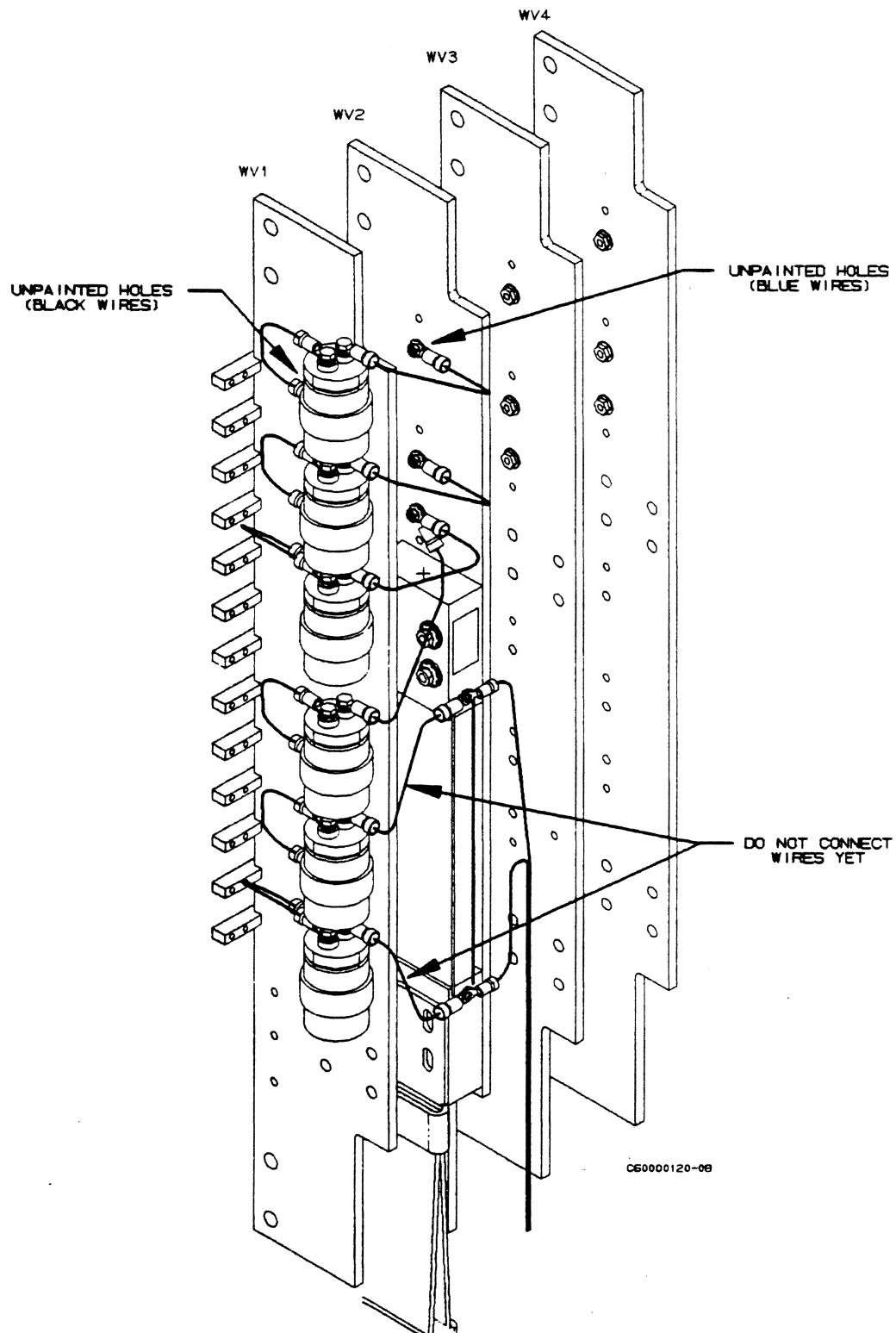


Figure 3-23. Capacitor Installation on CP-1

- 7. Attach three capacitors marked WV4 to side of WV4 as shown in figure 3-24.
Torque screws to 1.9 N·m (17 lbf·in).
- 8. Fasten black wire from each capacitor to unpainted hole adjacent to capacitors.
Torque screws to 1.9 N·m (17 lbf·in).

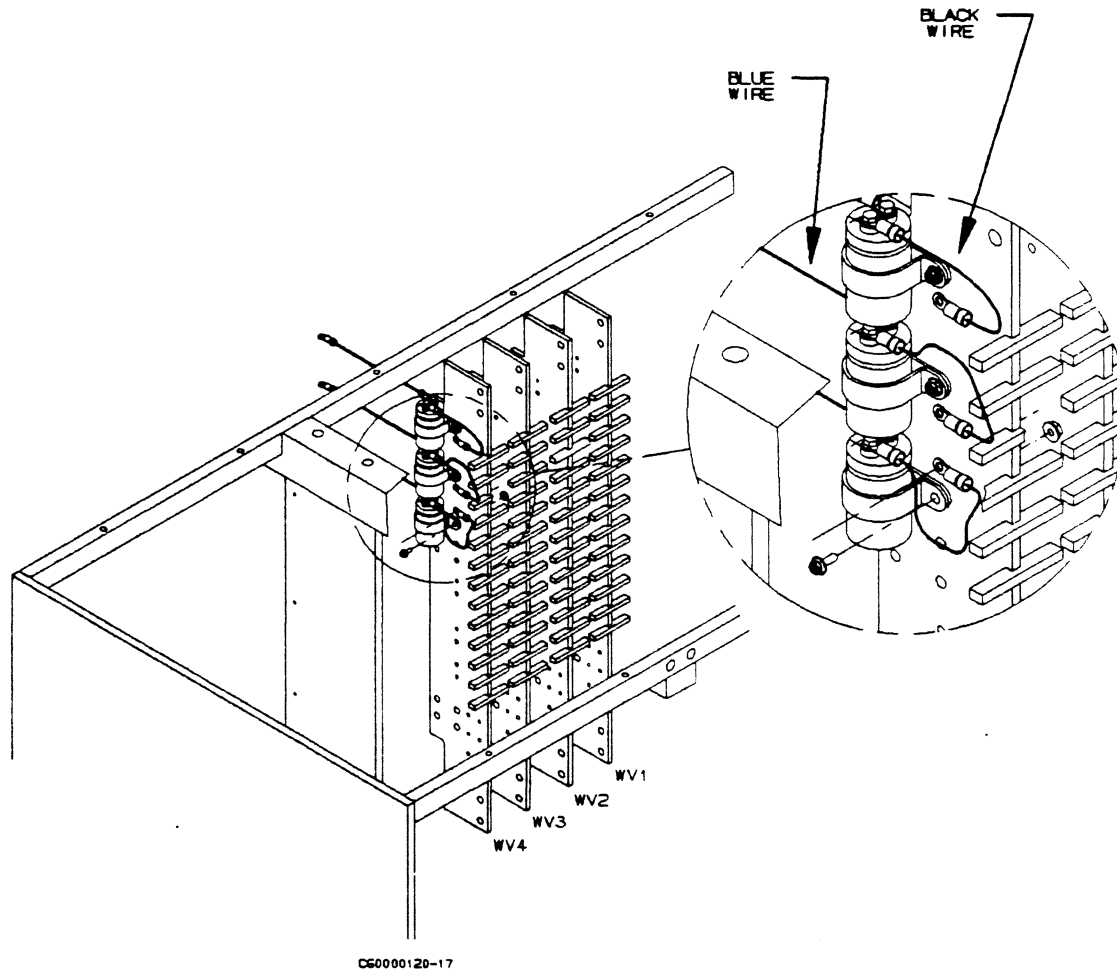


Figure 3-24. Capacitor Installation on CP-1

- 9. Fasten blue wires from capacitors to unpainted holes on WV3 (figure 3-25).
Torque screws to 1.9 N·m (17 lbf·in).

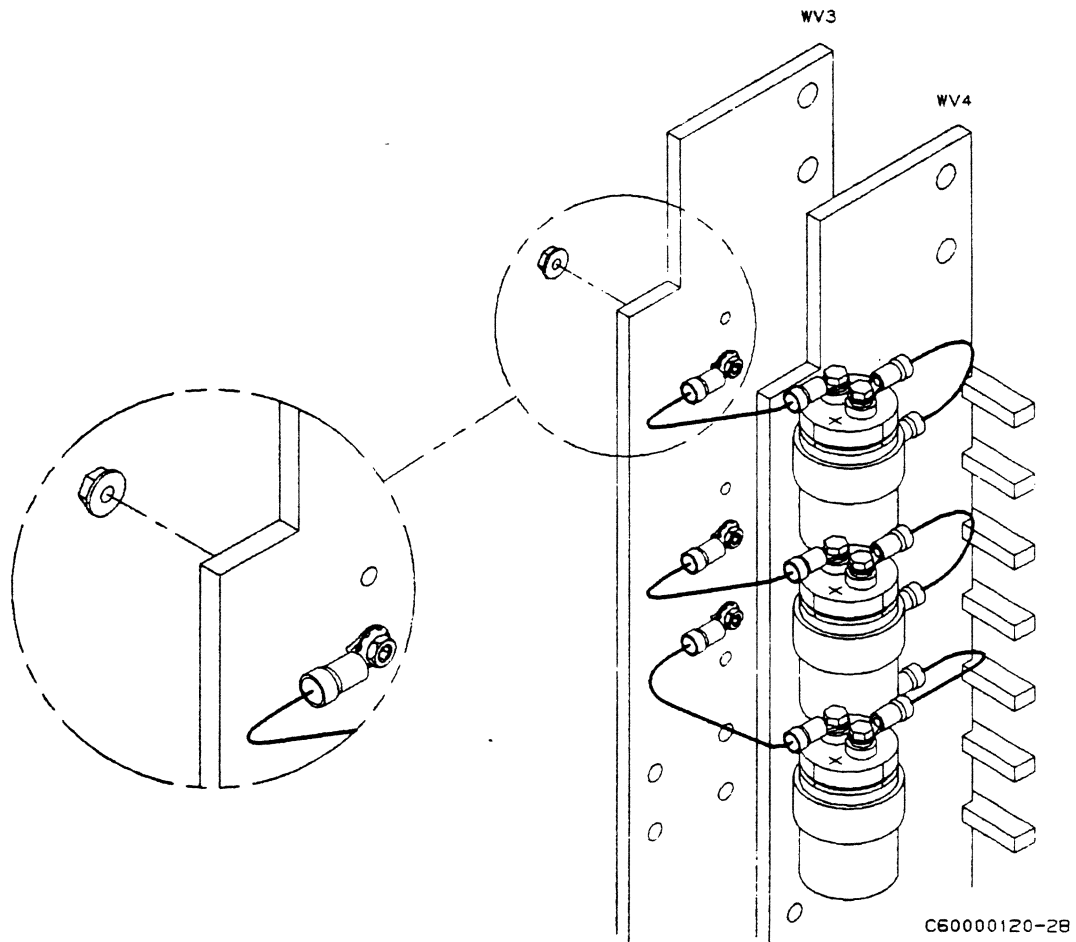


Figure 3-25. Capacitor Installation on CP-1

Install Shunt and Connect Braided Bus Bar Straps

Use this procedure to install the shunt on CP-1 WV2, to attach the temperature sensor to WV2, and to tighten the bus bars to the braided bus bar straps.

⚠ WARNING

Do not come in direct contact with electrical grease. It may irritate the skin and is harmful if swallowed.

- ___ 1. Put on protective stretch gloves (supplied with system installation kit).

⚠ CAUTION

Be careful when cleaning contact areas with Scotch Brite, as it is very abrasive. Don't rub hard, or you'll remove the plating.

- ___ 2. Lightly clean contact areas of shunt, WV2 braided bus bar strap, and WV2 (figure 3-26) with Scotch Brite and apply light coating of EJC #2.
- ___ 3. Locate installation kit #CP1-12.

⚠ CAUTION

Shunt must be mounted as shown in figure. The end with the insulator must be down, and the insulator must contact the bus bar.

- ___ 4. Mount shunt, temperature sensor assembly, and bus bar strap to WV2. Torque top four bolts to 7.3 N·m (65 lbf·in), and bottom bolts to 5.6 N·m (50 lbf·in).
- ___ 5. Lightly clean remaining braided bus bar straps and bus bar contact areas with Scotch Brite, and apply light coating of EJC #2.
- ___ 6. Bolt remaining braided bus bar straps to bus bars. Torque all bolts to 7.3 N·m (65 lbf·in).
- ___ 7. Attach warning label to shunt as shown.

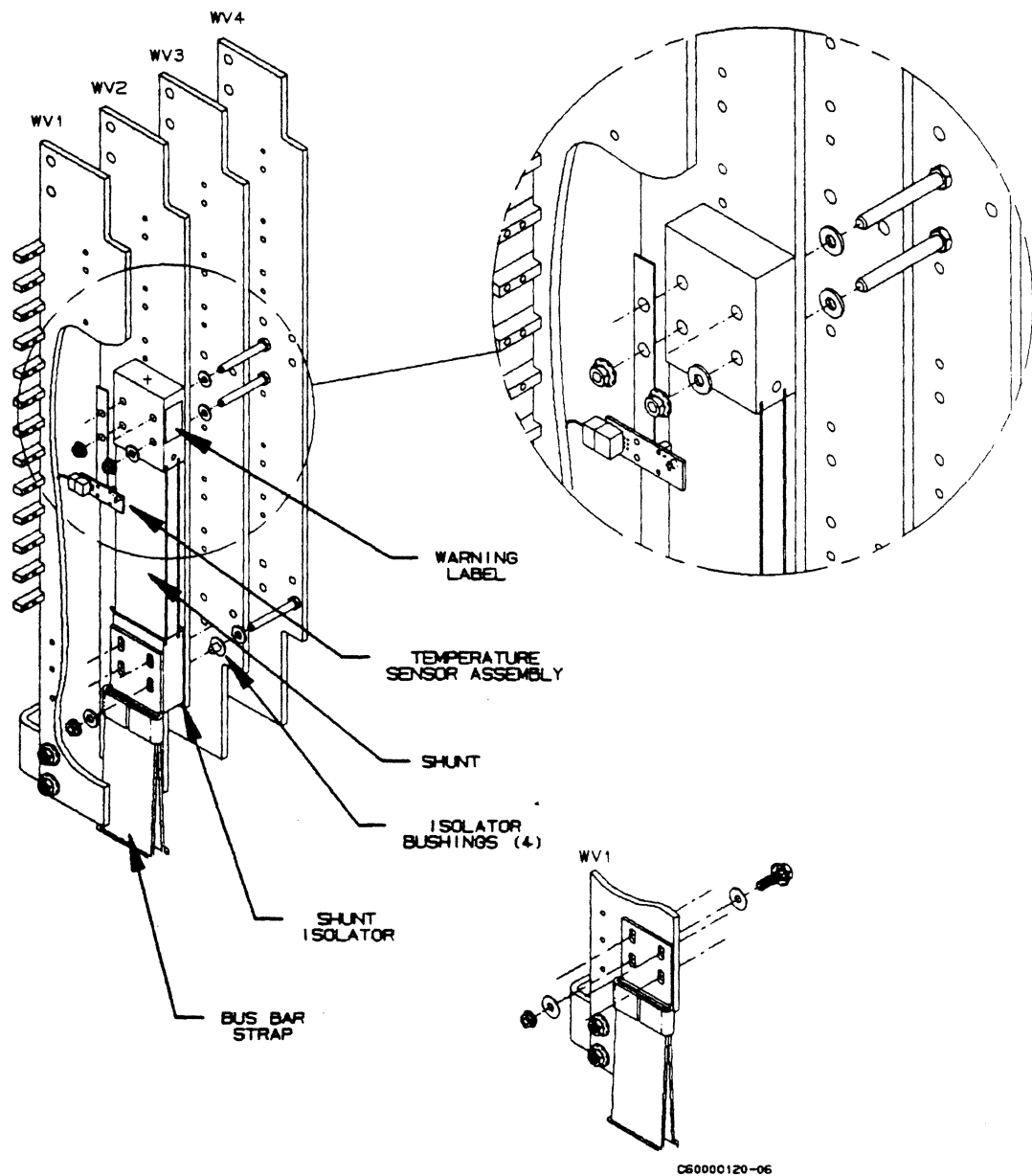


Figure 3-26. Connecting Shunt and Braided Bus Bar Straps

Install Bus Bar Temperature Sensor

Use this procedure to install the WV3 bus bar temperature sensor.

- 1. Locate installation kit #CP1-13.
- 2. Attach temperature sensor assembly to WV3 as shown in figure 3-27. Torque screws to 7.3 N·m (65 lbf·in).

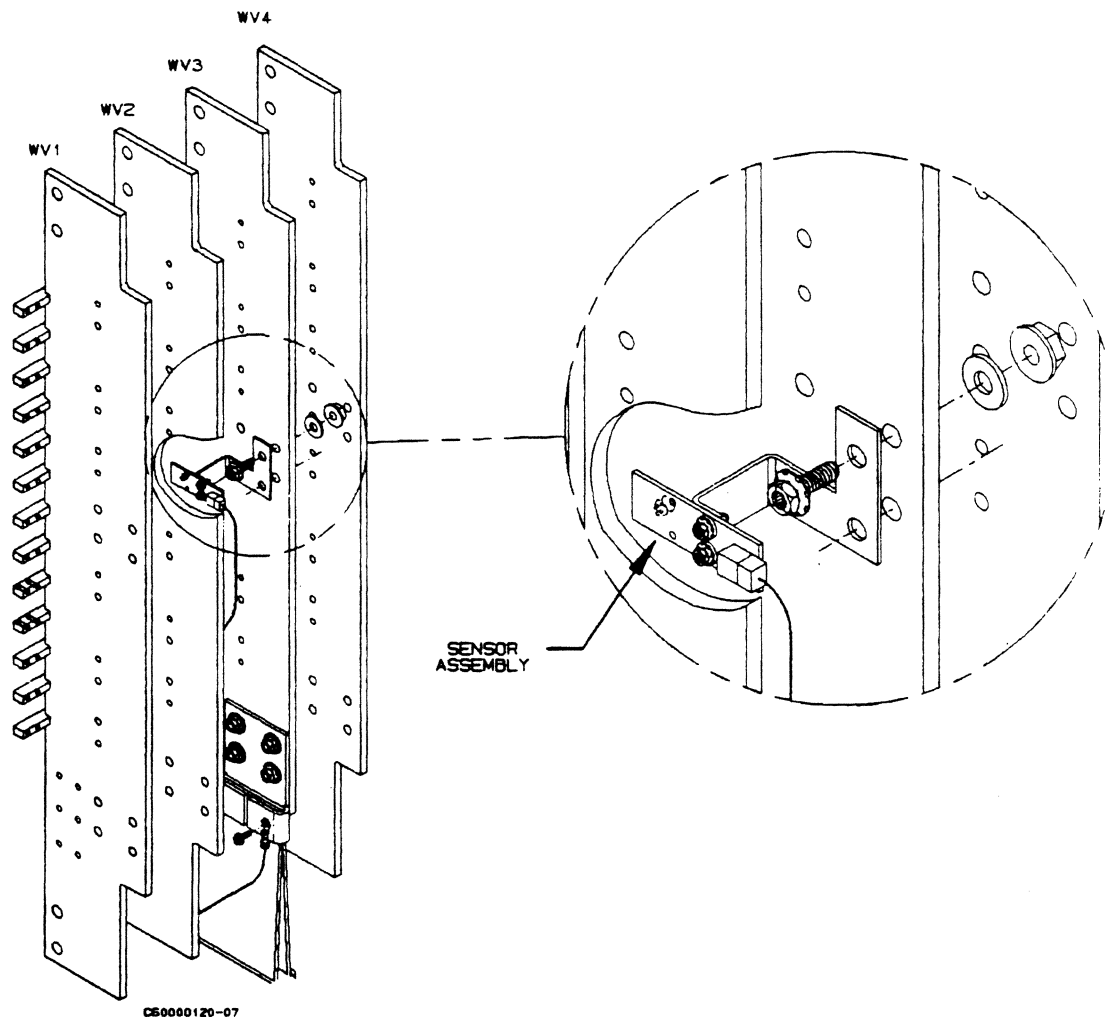


Figure 3-27. Install Bus Bar Temperature Sensors

Connect CP-1 Regulator Pak Cable

Use this procedure to connect the CP-1 Regulator Pak cable and thus complete the wiring tasks.

1. Attach blue wires from two bottom capacitors on WV1 and wires from CP-1 Regulator Pak cable to shunt as shown in figure 3-28. Screws are already attached to shunt. Torque to 1.9 N·m (17 lbf·in).

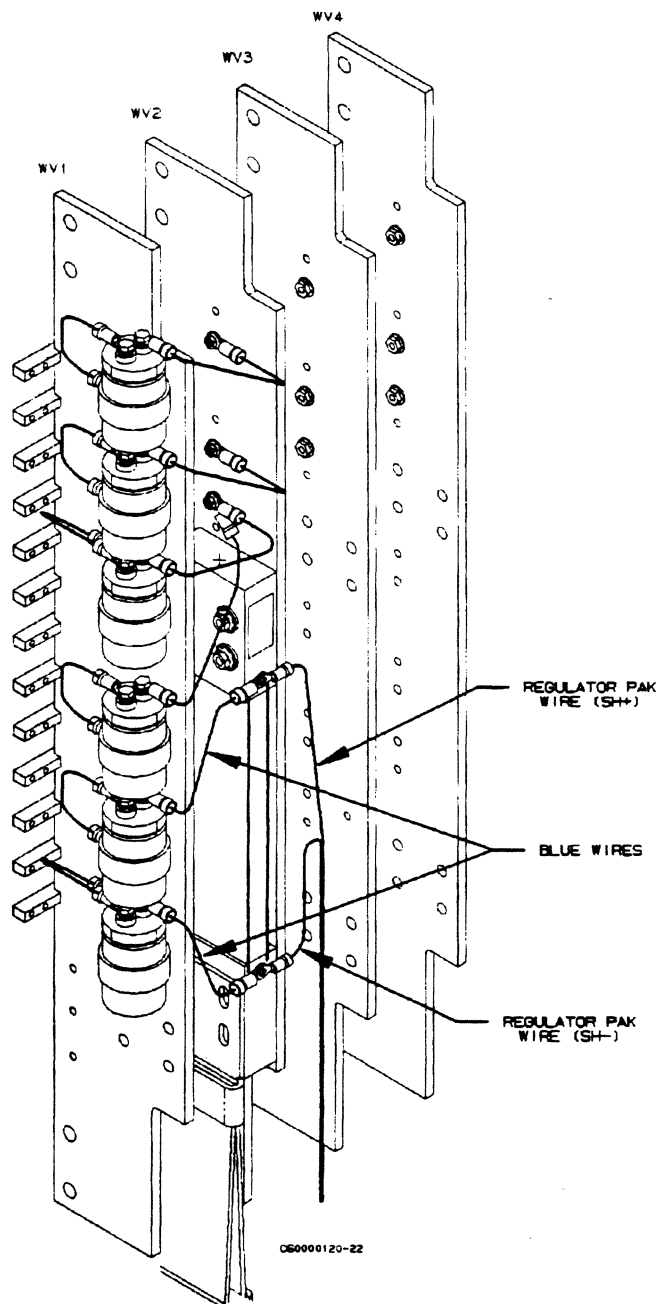


Figure 3-28. Regulator Pak Cable Location

Connecting Logic Cables

The following procedures describe installing a ribbon cable support plate in the primary IOU, and connecting the cables between the IOU and SIBC in CP-1, and between SIBB and SIBC.

- Install Ribbon Cable Support Plate
- Route and Connect SIB to IOU Cables
- Install SIBB to SIBC and Interlock Cables

Install Ribbon Cable Support Plate

Use this procedure to install the ribbon cable support plate in the primary IOU.

NOTE

If the support plate is already mounted in the IOU, skip to the next procedure.

- ___ 1. Locate ribbon cable support plate in installation kit.
- ___ 2. Remove bolt from IOU as shown in figure 3-29.
- ___ 3. Insert bolt through elongated hole in support plate. Push support plate tightly against IOU frame (away from bolt) and tighten bolt.

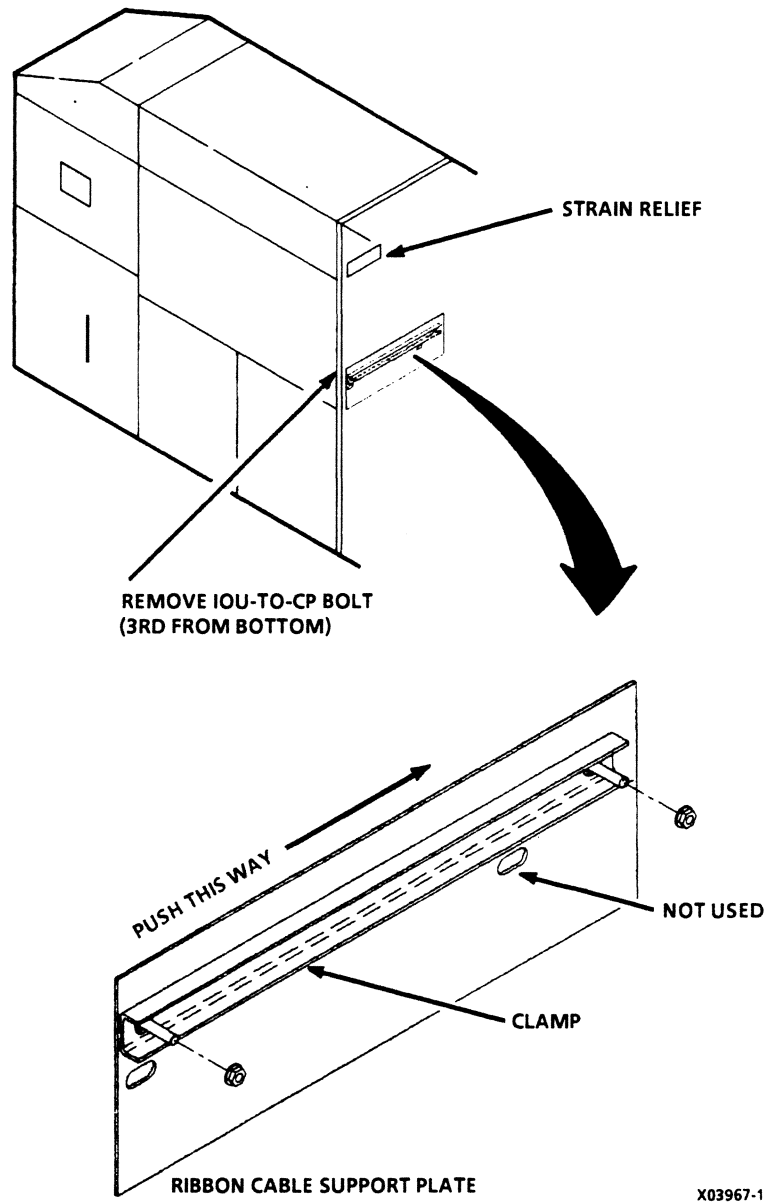
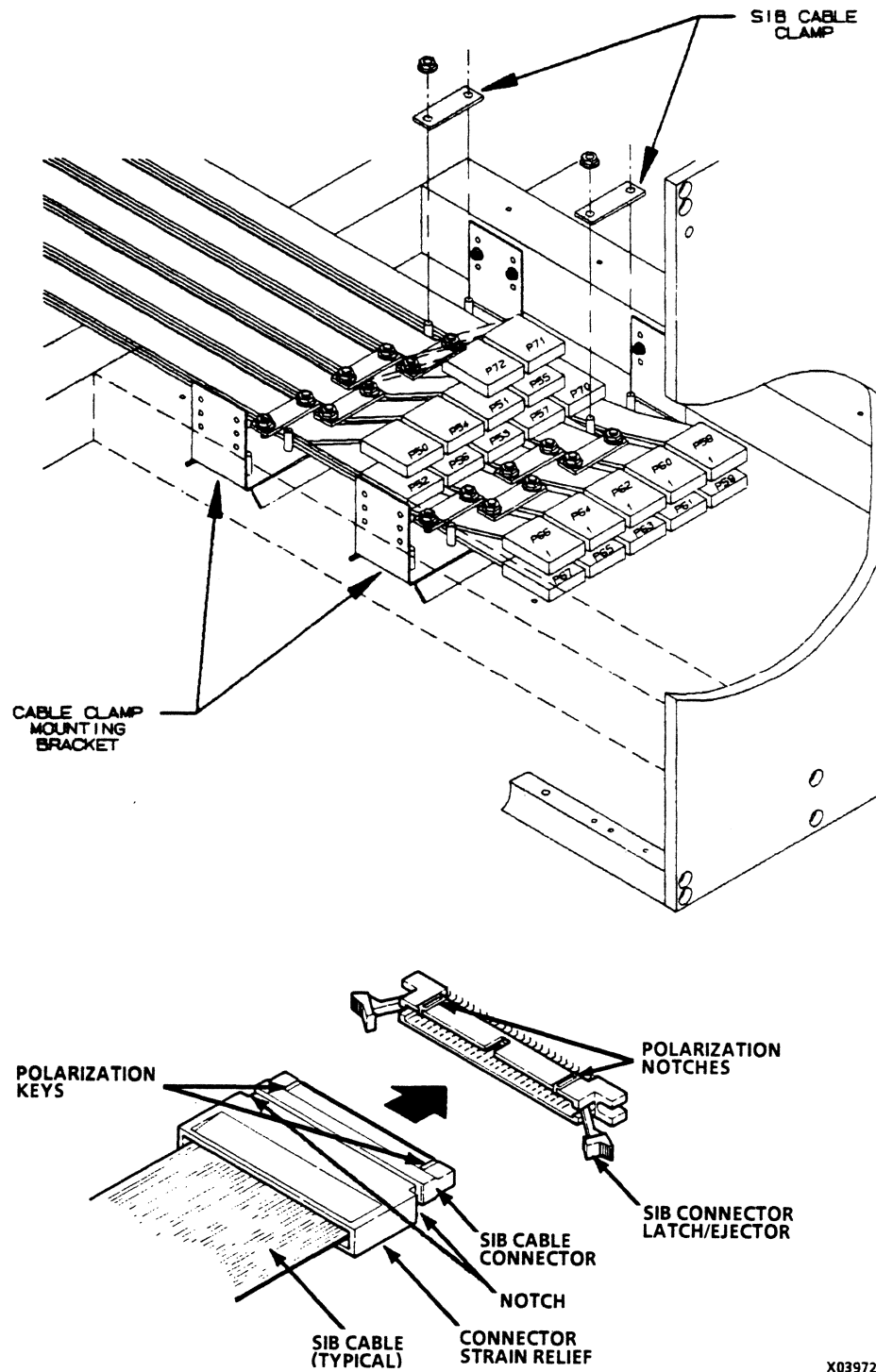


Figure 3-29. Ribbon Cable Support Plate Installation

Route and Connect SIB to IOU Cables

Use this procedure to route and connect the three SIB-to-IOU cables.

- ___ 1. Remove CP-0 Regulator Pak and channel.
- ___ 2. Remove five lowest modules from CP-0 and store in antistatic containers.
- ___ 3. Install multipoint connector alignment gauge in fifth slot from bottom. Gauge will protect lowest installed module.
- ___ 4. Reseat all previously installed SIB cables by pushing on connector strain relief until connector bottoms into SIB (figure 3-30). Connector is fully seated when connector latch/ejectors snap into notches between connector and connector strain relief.
- ___ 5. Remove protective coverings from SIB cable connectors.
- ___ 6. Remove SIB cable clamps from back row only of SIB cable mounting brackets.
- ___ 7. Carefully lift up SIB cables already installed, and route new SIB to IOU cables beneath existing cables.
- ___ 8. Replace SIB cable clamps onto SIB cable mounting brackets.



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Figure 3-30. SIB Cable Clamps and Mounting Brackets

- ___ 9. Remove outside nut from ribbon cable support plate clamp and allow clamp to swing down. Loosen inside nut but do not remove.
- ___ 10. Route cables through unit cable openings into IOU (figure 3-31). Place cables against ribbon cable support plate.

⚠ CAUTION

Tighten ribbon cable support plate clamp nuts just enough to support cables without allowing them to slip down. Do not overtighten, crushing cables.

- ___ 11. Swing ribbon cable support plate clamp up, install nut and washer removed earlier, and tighten.

NOTE

IOU header connectors J73, J74, and J75 are unused.

⚠ CAUTION

To avoid damage to connectors, insert connectors with keyed slots facing left.

- ___ 12. Connect SIB cables to IOU header (hdr) panel as listed in table 3-1.

Table 3-1. SIB to IOU Header Panel Cable Connections

Blue Group

SIBC Cable	IOU Hdr
---------------	---------

P76	J76
P77	J77
P78	J78

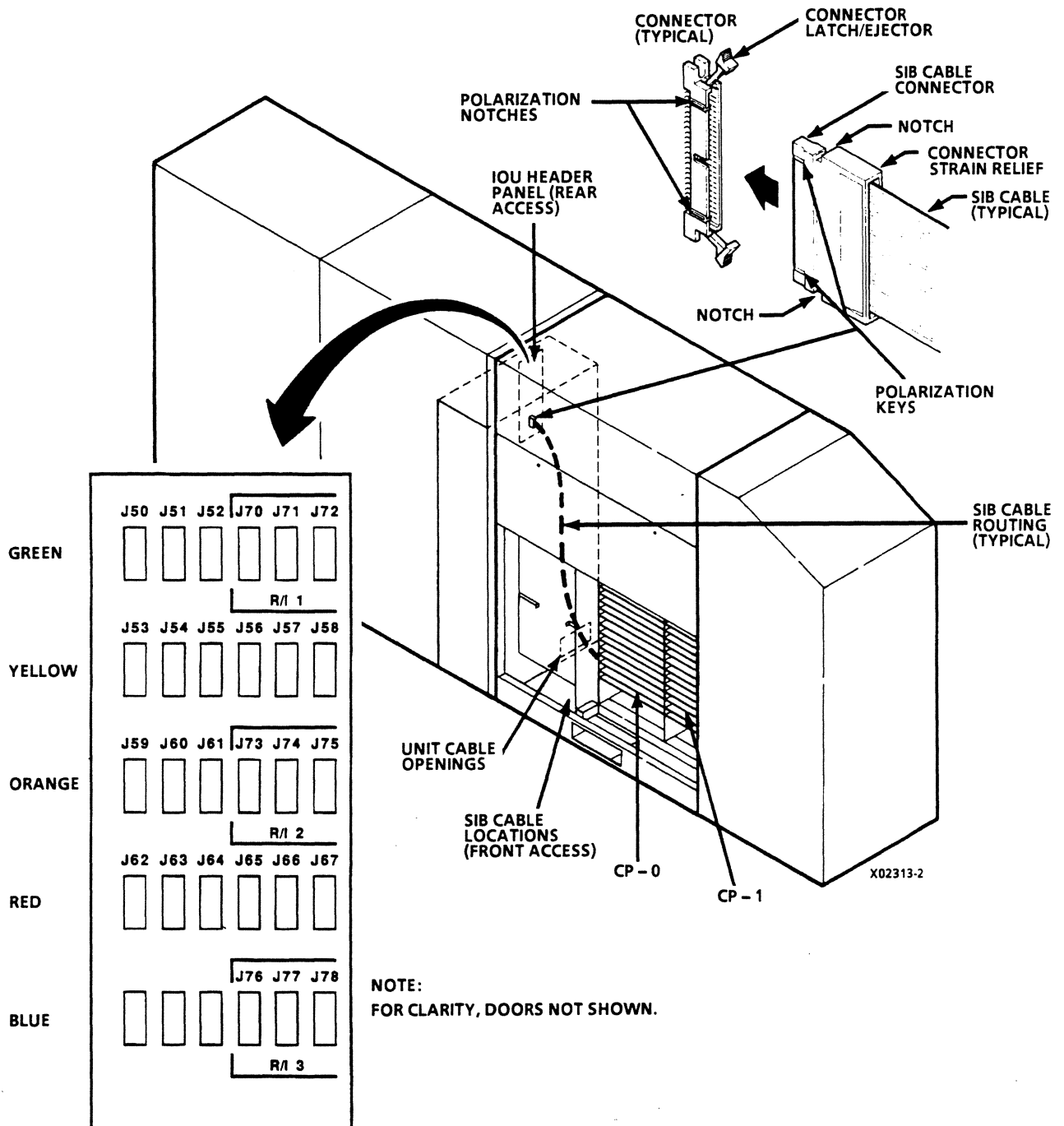


Figure 3-31. CP-1 SIBC to IOU Cabling

Install SIBB to SIBC and Interlock Cables

Use this procedure to install the twelve SIBB-to-SIBC cables, and the interlock cable.

- ___ 1. If Remote IOU is present, pull all Remote IOU Interface Module cables out front of CP-1. They will be connected to Module in a later procedure.
- ___ 2. Locate twelve SIBB to SIBC cables in installation kit (labeled LM1 P40 through LM1 P51).

▲ CAUTION

SIB connectors are not keyed and can be installed incorrectly.

- ___ 3. Install cables (figure 3-32) using decal on blower box as a guide. Note location of pin 1 according to the applicable substep below.
 - ___ a. SIBB pin 1 is up and towards the front of the CP.
 - ___ b. SIBC pin 1 is down and towards the front of the CP.

NOTE

Do not discard the jumper plug removed in the next step. If it is ever necessary to revert to a single CP configuration, plug must be plugged back into wiring harness.

- ___ 4. Locate wiring harness coiled in bottom of CP cabinet. Remove jumper plug labeled INT J82 from wiring harness connector labeled INT P82. Tape plug to inside of CP door.
- ___ 5. Route connector and wires into CP-1. Connect INT P82 to SIBD location "INTLK J82."

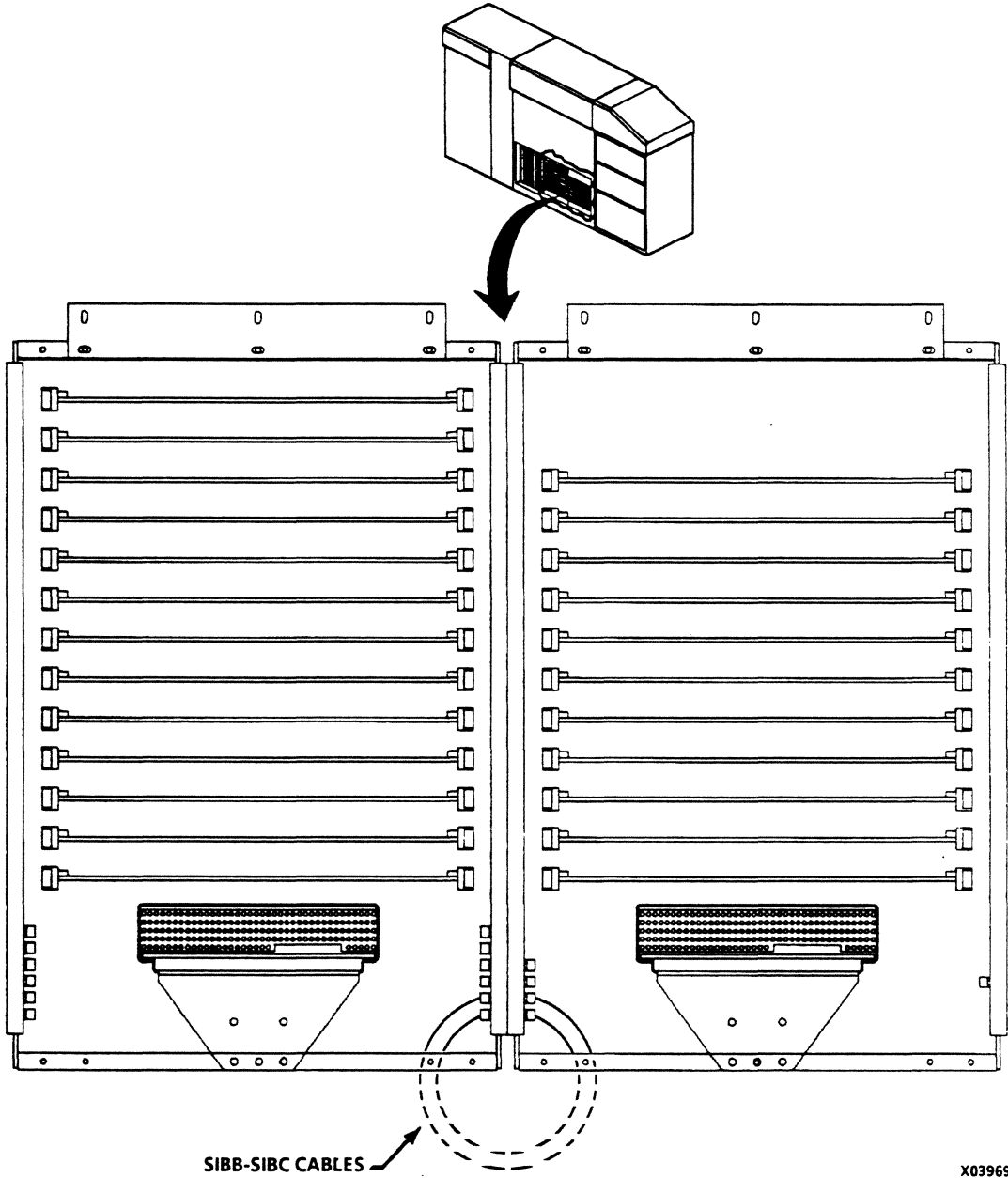


Figure 3-32. SIBB to SIBC Cabling

To present the information in this chapter in a structured format, this page has been left blank.

Installing CP Logic Modules and Regulator Paks

The following procedures describe how to install the CP logic modules, regulator paks, and the rear air seal cover. The CP-1 modules are not shipped installed in the CP, but are packaged in a separate container.

- Install CP Modules
- Install CP Regulator Pak
- Install Air Seal Cover and Brackets

Install CP Modules

Use this procedure to install the logic modules into CP-1, and to install the logic modules removed from CP-0 in an earlier procedure.

- ___ 1. Locate special module tools in installation kit that ships with system:
- Pin alignment gauge
 - Pin straightener
 - Quick release

⚠ CAUTION

Use only the quick release intended for the cams. Other quick releases or devices will cause damage.

- ___ 2. Pull out all cams from cage, using quick release. Cams must be pulled out far enough so board interlocks automatically rotate into cams and lock cams in fully extended position.

⚠ CAUTION

Hold modules by the front handle and the back power connectors. Do not hold modules by the eight side connectors.

Inspect modules for condensation after removing them from their packaging material. Modules should not be installed if they are cold and/or damp.

- ___ 3. Remove LMB logic module from shipping container.
- ___ 4. Remove LMB module from antistatic bag, and lay on an antistatic workbench.

- 5. Remove connector covers from module (figure 3-33).
- 6. Check for bent or broken connector pins by placing alignment gauge over pins. Use pin straightener to straighten pins as necessary.

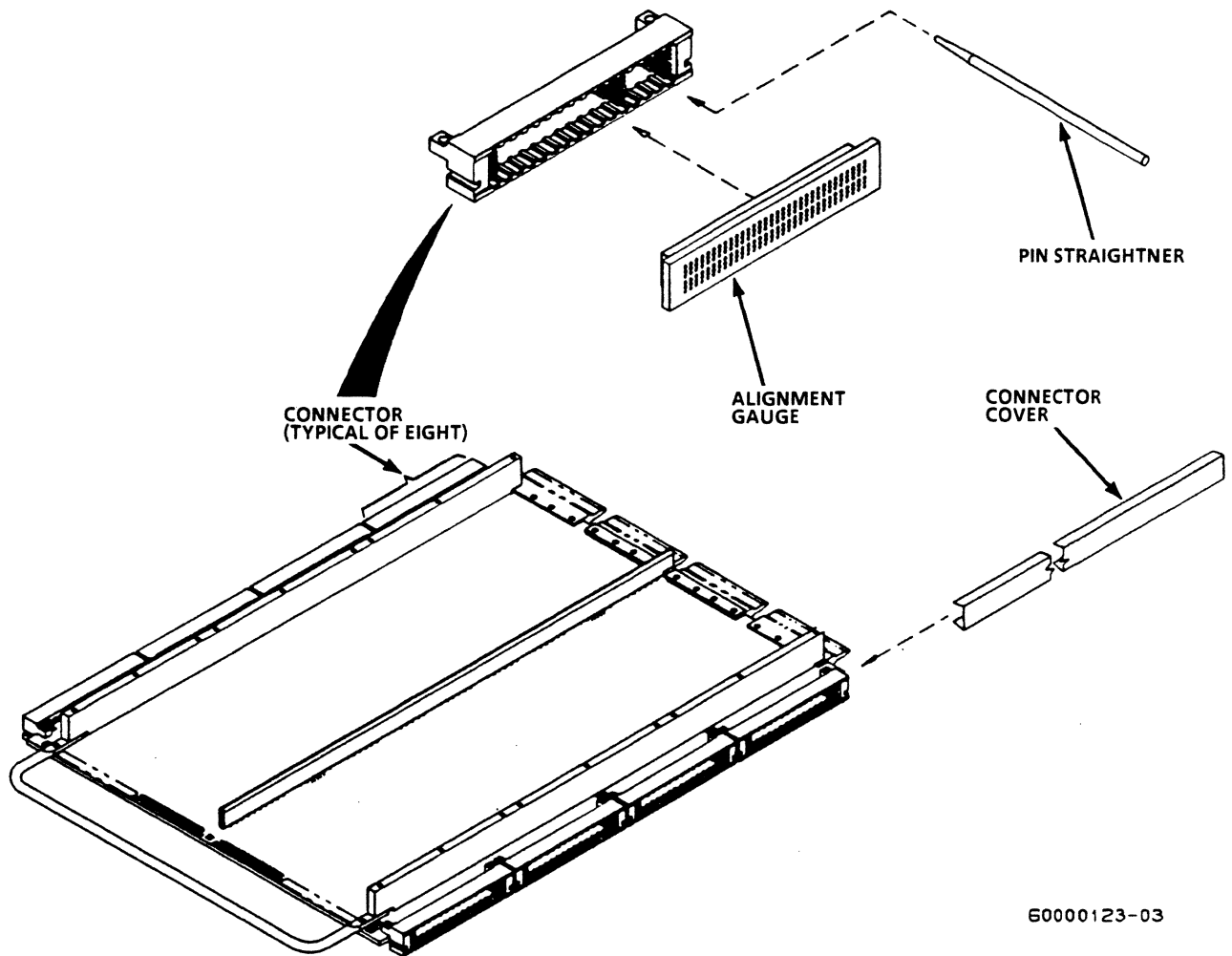


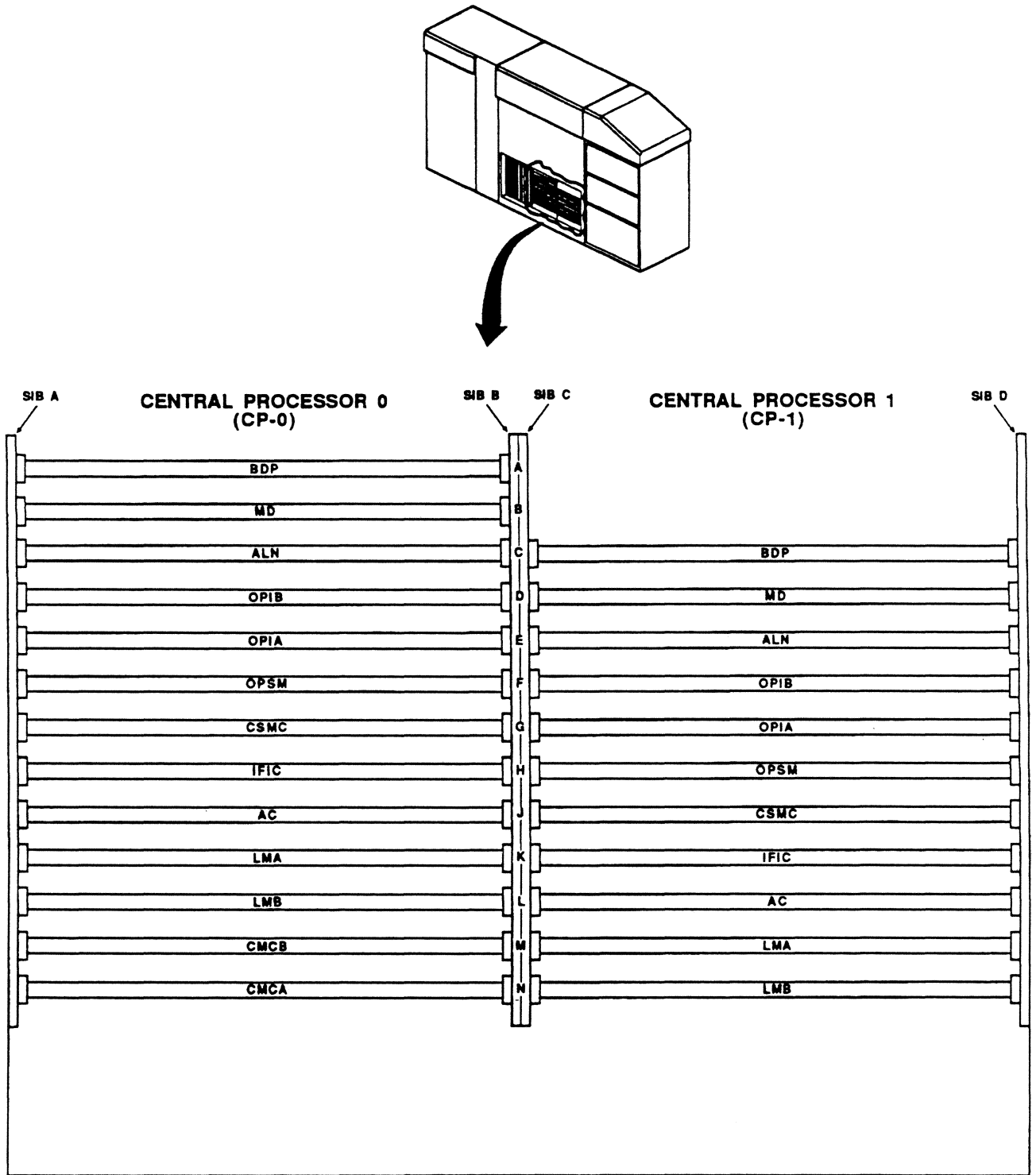
Figure 3-33. Logic Module and Pin Alignment Gauge

- ___ 7. Locate associated module slot in CP cage (figure 3-34) and check that quick release is not in either cam.
- ___ 8. Center edge of module in slot.

 CAUTION

When pushing module into its slot, observe the underside of the module to be sure that any wires on the underside do not catch on anything below.

- ___ 9. Push module slowly into slot, through a springy resistance, until module seats in rear connectors with an audible thud.



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Figure 3-34. CP Logic Module Locations

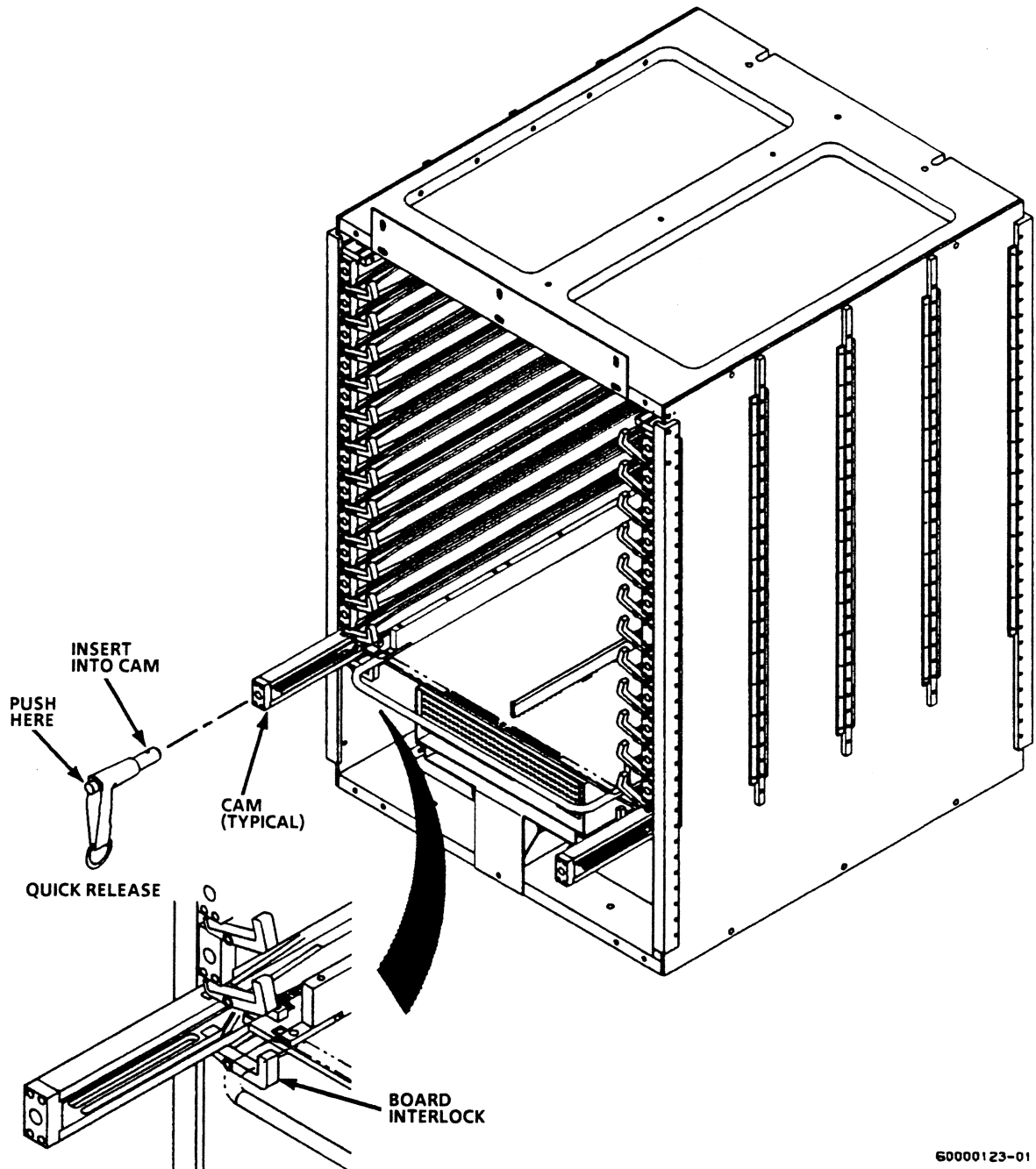
- ___ 10. Rotate board interlock out of left cam bracket (figure 3-35) and momentarily hold interlock while pushing cam fully into cage.

⚠ CAUTION

Do not force cam in. If cam binds or does not move relatively freely, pull cam out, and push in again.

If cam still binds, fully pull out both cams, remove module, check for and correct any bent or broken pins, reseal module, and push cams in again.

- ___ 11. Rotate board interlock out of right cam bracket and momentarily hold interlock while pushing cam fully into cage.
- ___ 12. Install remaining CP-1 modules in same manner, working from bottom to top of cage as follows.
 - x a. LMB
 - ___ b. LMA
 - ___ c. AC
 - ___ d. IFIC
 - ___ e. CSMC
 - ___ f. OPSM
 - ___ g. OPIA
 - ___ h. OPIB
 - ___ i. ALN
 - ___ j. MD
 - ___ k. BDP
- ___ 13. Repeat above instructions to install five CP-0 modules removed in an earlier procedure.



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Figure 3-35. CP Cage Details

NOTE

If Remote IOU is not present, skip to the next procedure.

- ___ 14. Locate Remote IOU Interface Module.
- ___ 15. Hold Remote IOU Interface Module upright (vertically) and plug in SIB cables.
Use decal on front of CP as a guide (figure 3-36).
- ___ 16. Carefully slide Remote IOU Interface Module into CP-1, pushing SIB cables into
CP base as module is being inserted.
- ___ 17. Insert retaining screws into Remote IOU Interface Module.

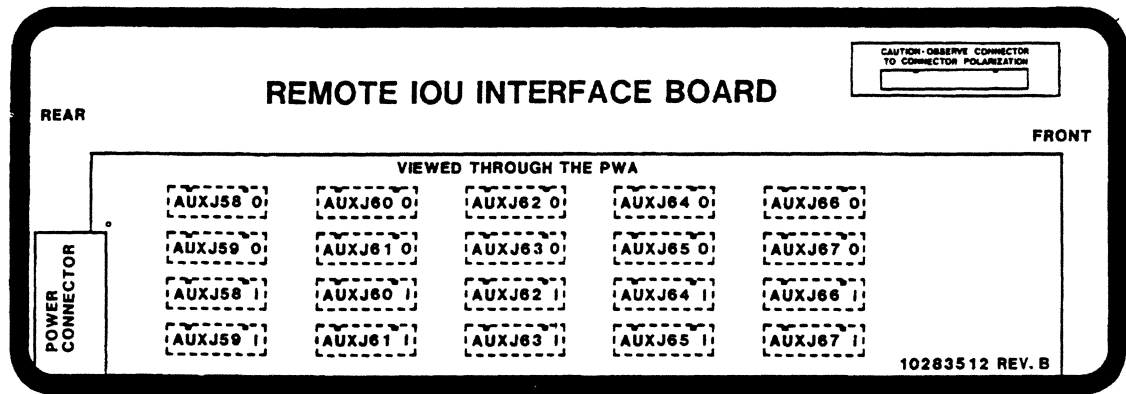


Figure 3-36. Remote IOU Interface Module Cabling

Install CP Regulator Pak

Use this procedure to install the CP regulator paks. CP-1 regulator pak was shipped in a separate container, and the CP-0 regulator pak was removed in an earlier procedure.

- ___ 1. Install Regulator Pak channels in both CP-0 and CP-1.

NOTE

If Standalone IOU is present, the CP-1 channel will be shorter than the CP-0 channel.

- ___ 2. Remove regulator pak from antistatic bag.

⚠ CAUTION

Carefully push SIB cables out of the way when inserting regulator pak into CP, as pak may catch on cables and damage them.

- ___ 3. Place pak on channel guide (figure 3-37) at bottom of CP-0 logic cage. Slide pak into cage, through a springy resistance, until it seats in rear connectors.
- ___ 4. Install regulator pak retaining screw(s).
- ___ 5. Repeat this procedure for CP-1, after removing retaining screws from mounting holes.
- ___ 6. In CP-0, connect P1 and P3 to front of regulator pak.
- ___ 7. In CP-1, connect P1 to front of regulator pak. Remove jumper plug A8J3 from A8P3 (part of wiring harness coiled in bottom of CP), and connect A8P3 to J3 in front of regulator pak.

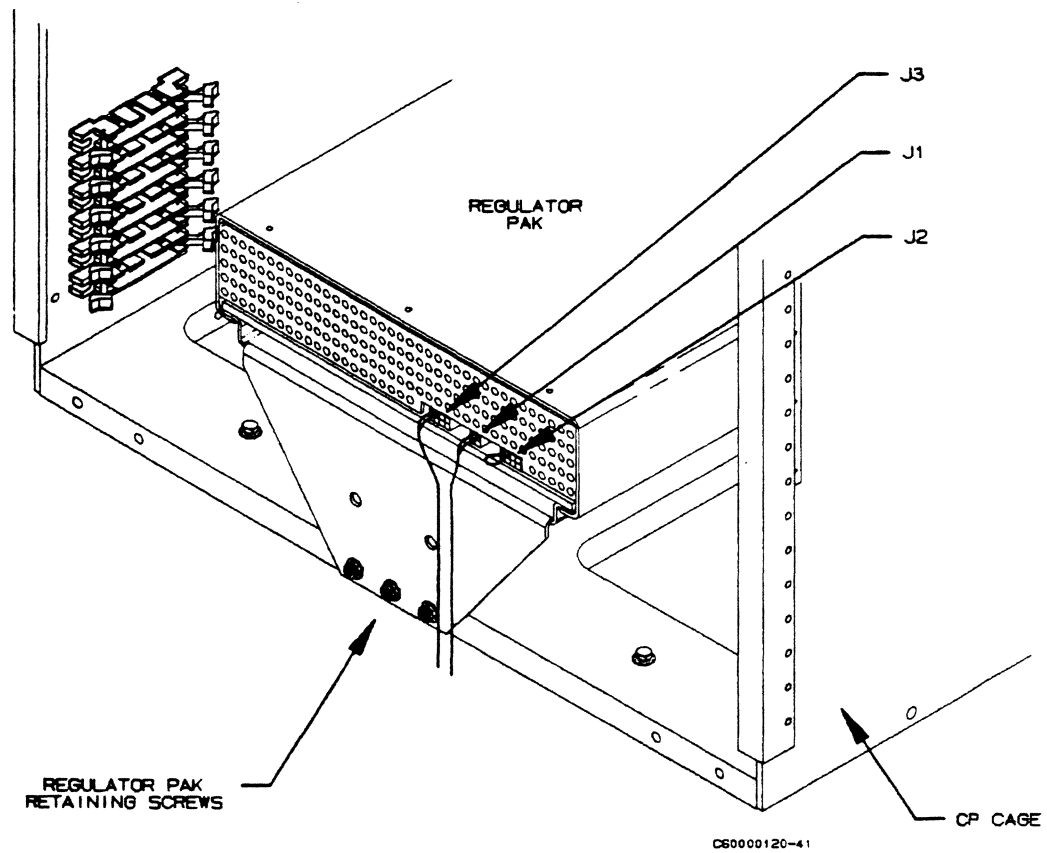


Figure 3-37. CP Regulator Pak

Install Air Seal Cover and Brackets

Use this procedure to install the air seal cover brackets and the cover removed earlier.

- ___ 1. Install top, bottom, and left air seal cover brackets (figure 3-38).
- ___ 2. Install air seal cover.
- ___ 3. Turn air seal cover retaining fasteners 1/4-turn clockwise to tighten.

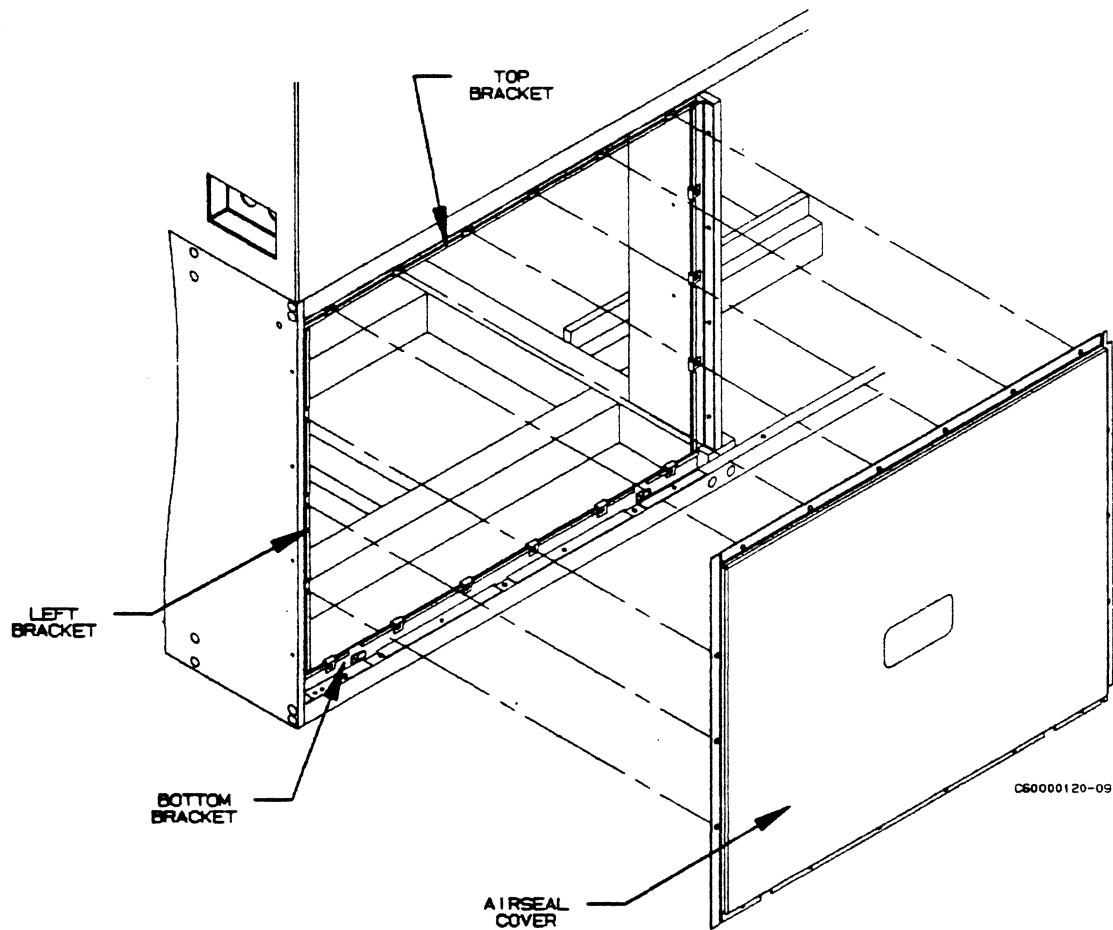


Figure 3-38. Air Seal Cover and Mounting Brackets

Applying Power

The following procedures describe the checks and adjustments necessary to bring the mainframe to an initial state of operation. These procedures assume that all parts of the mainframe are in correct working order, and that the optional CP-1 has been installed correctly.

The correction of any problem resulting from a malfunction must be referred to the maintenance manuals listed in the front of this manual.

- Apply Power
- Adjust Power Unit Voltages

Apply Power

Use this procedure to start the MG set and to check the MG voltage at the power unit.

- ___ 1. Be sure that all previous procedures are completed.
- ___ 2. Set site 50/60-Hz power circuit breakers that control power to MG set and MG interface unit to ON (figure 3-39).
- ___ 3. Set NORMAL/DISABLE switch on SYSTEM POWER STATUS panel on front of power unit to DISABLE.
- ___ 4. Set site 400-Hz circuit breakers for power unit and MG interface unit to ON.
- ___ 5. Set 50/60 Hz DISCONNECT at rear of power unit to 1 (ON).
- ___ 6. Set 400 Hz DISCONNECT at rear of power unit to 1 (ON).
- ___ 7. Press LOCAL ON switch/indicator on front of power unit. Indicator lights and MG starts. MG requires approximately 1 min to obtain full output voltage.
- ___ 8. Set cabinet power status switches to AUX and MSG. Display should read AAA.

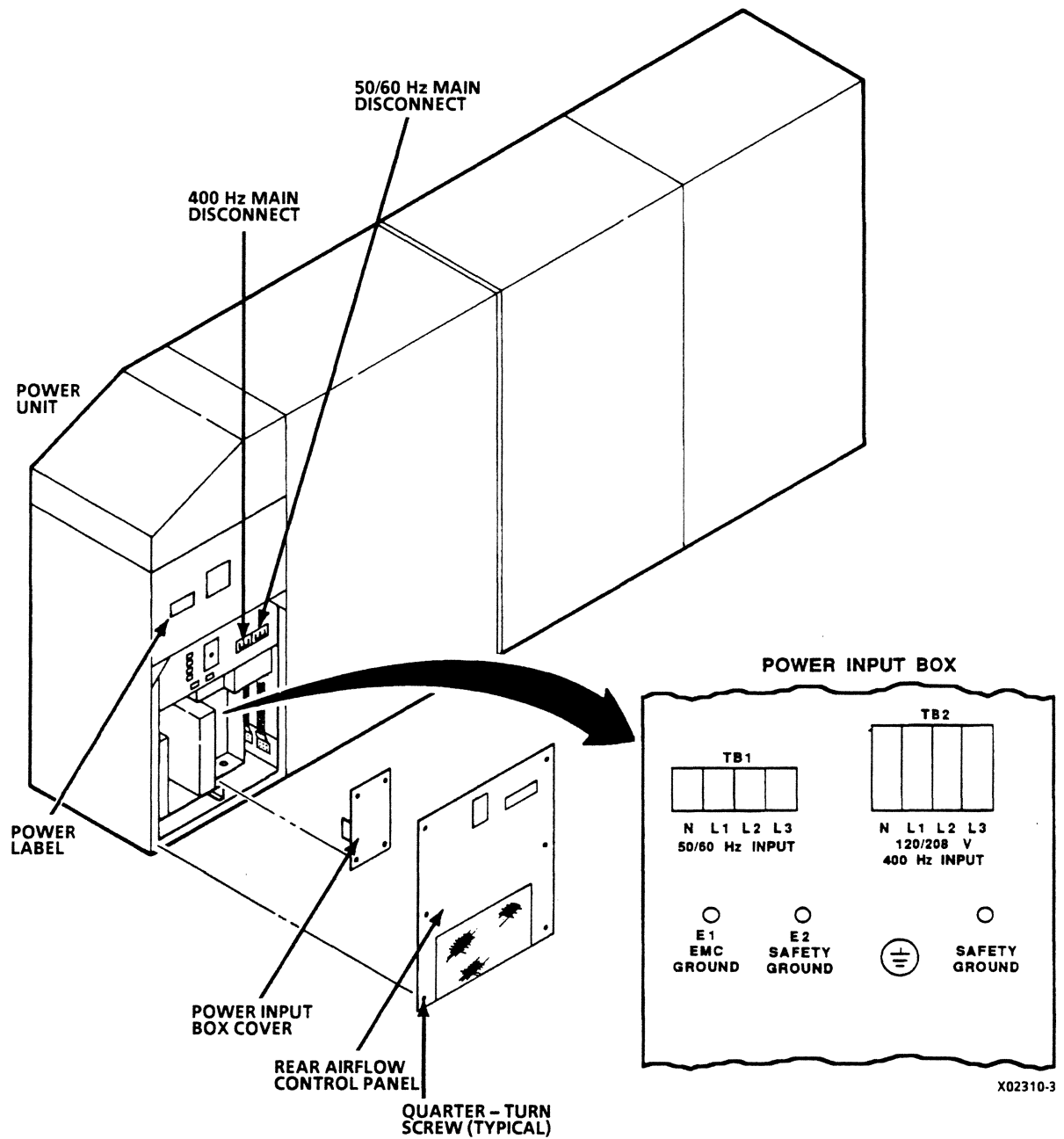
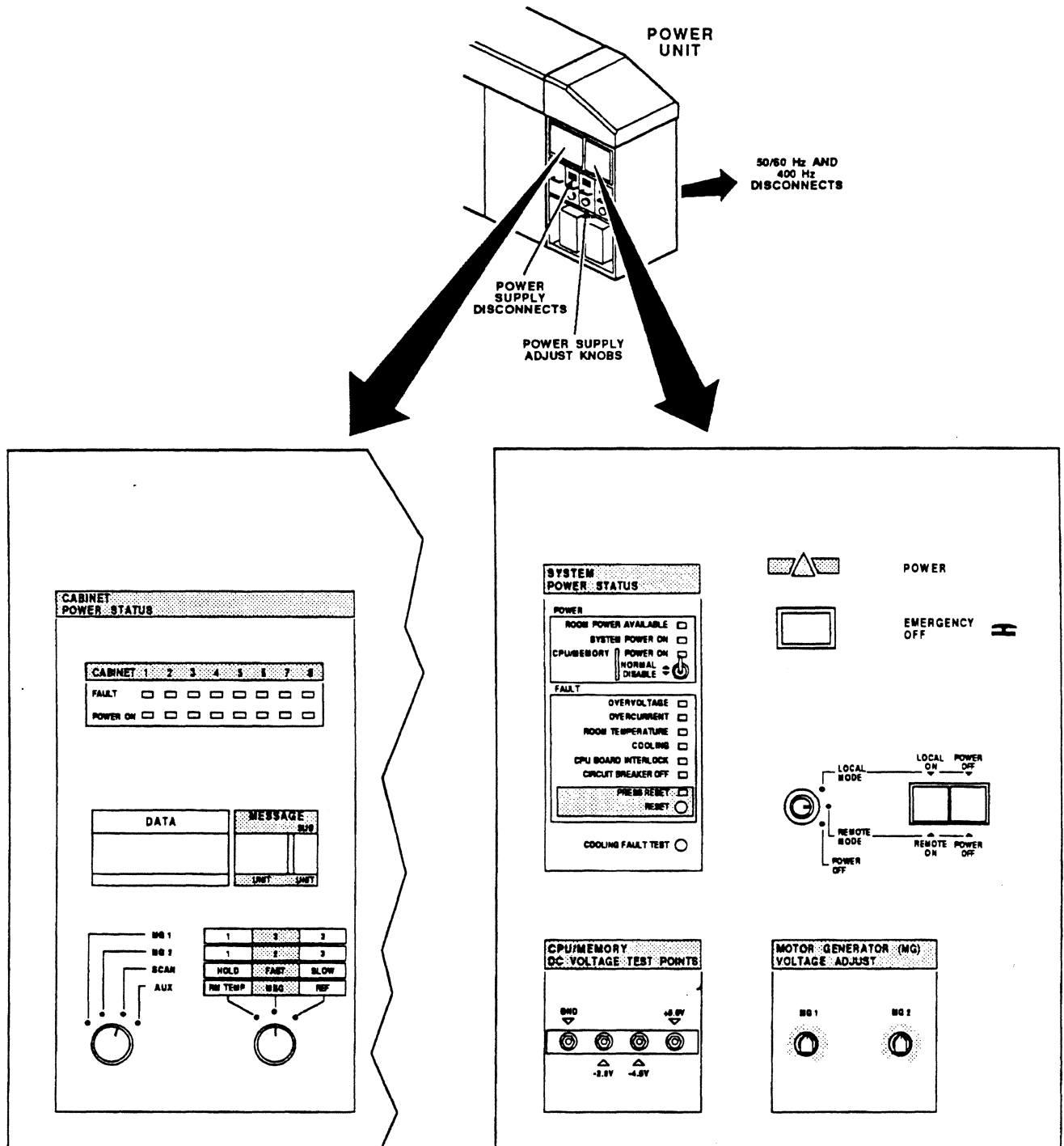


Figure 3-39. Power Unit 400-Hz Input Voltage Check

Adjust Power Unit Voltages

Use this procedure to adjust power unit dc voltages during the initial application of power.

- ___ 1. Be sure that previous procedure is completed.
- ___ 2. Connect voltmeter between GND and -2.0V test points on control panel (figure 3-40).
- ___ 3. Turn -2.0-V power supply ADJUST knob to obtain a voltmeter reading of -2.03 V.
- ___ 4. Connect voltmeter between GND and -4.50 V test points.
- ___ 5. Turn -4.5-V power supply ADJUST knob to obtain a voltmeter reading of -4.53 V.
- ___ 6. Connect voltmeter between GND and +5.0 V test points.
- ___ 7. Turn +5.0-V power supply ADJUST knob to obtain a voltmeter reading of +5.03 V.
- ___ 8. Set NORMAL/DISABLE switch on main control panel to DISABLE.
- ___ 9. Go to Checkout chapter in rear of manual for operating instructions.



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Figure 3-40. Power Unit Voltage Adjustment Controls

Checkout

4

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Test AT511-A (IOU 0) and Optional AT512-A (IOU 1)	4-5
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This chapter uses the following procedures to establish a confidence level that the central computer can run the operating system.

- Installing CIP
- Running Diagnostics
- Running Network Operation System Validation Suite
- Checking Electromagnetic Compatibility
- Installing and Testing RTA Equipment

Should any problems arise during the checkout that cause excessive delays that are not readily resolvable through normal checkout practices or through the use of maintenance manuals, call your CYBER Hardware Support (CHS) for sites in the U.S.A. or your Technical Support office for international sites.

Installing CIP

Use this procedure to install the CYBER Initialization Package (CIP).

- ___ 1. Locate following manuals for reference. Some manuals are for later procedures. All manuals are shipped with the equipment.
 - ___ a. CYBER Initialization Package Reference Manual
 - ___ b. 19003 System Console Operations/Maintenance Manual
 - ___ c. MSL 15X Off-Line Maintenance Software Library Reference Manual
 - ___ d. CYBER 96X MSL Test Procedures Reference Manual
 - ___ e. MSL 153/155 Maintenance Software Reference Manual Test Procedures
 - ___ f. MSL 153/155 Maintenance Software Reference Manual Test Descriptions
- ___ 2. Locate CIP tape. Your familiarization with the tape and a capability to set test parameters and modify command buffers are necessary. The tape ships with system and includes:
 - Common Test and Initialization (CTI)
 - Dedicated Fault Tolerance (DFT)
 - Environmental Interface (EI)
 - Maintenance Software Library (MSL)
 - Microcode
- ___ 3. Be sure to:
 - ___ a. Read all bulletins, software releases, and special instructions supplied with the CIP Reference manual.
 - ___ b. Check that all installation procedures are completed and all unit doors are shut and latched.
 - ___ c. Check that system peripheral equipment is installed and operating.
- ___ 4. Perform Power-on Initialization procedure for system console. (Refer to instructions in System Console Operations/Maintenance manual.)
- ___ 5. Install CIP tape. (Refer to detailed instructions in CIP Reference manual.)
- ___ 6. Deadstart from CIP disk. Refer to CIP Reference manual.

Running Diagnostics

Use the following procedures to run diagnostic tests under normal conditions without voltage and clock margins. The procedures require selections that depend upon the IOU and CPU configurations.

To select the applicable procedures, you need to know if the system includes the AT478-B IOU or the AT511-A IOU and which of the optional AT481-B IOU expansion, AT512-A IOU expansion, AT511-A standalone IOU, and AT512-A standalone IOU expansion units are present.

The procedures are:

- Test AT478-B (IOU 0) and Optional AT481-B (IOU 1)
- Test AT511-A (IOU 0) and Optional AT512-A (IOU 1)
- Test Optional Standalone AT511-A (IOU 2) and AT512-A (IOU 3)

You will also need to know if the CPU includes a single processor or a dual processor.

- Run CP-0 Quicklook Tests
- Run CP-1 Quicklook Tests

Test AT478-B (IOU 0) and Optional AT481-B (IOU 1)

Run IOU diagnostic tests listed in table 4-1. Run the tests under normal conditions, no logic or clock margins.

If any problems occur during the tests, refer to the following IOU manuals:

- MSL 153/155 Maintenance Software Reference Manual Test Procedures
- MSL 153/155 Maintenance Software Reference Manual Test Descriptions

Table 4-1. IOU Tests for AT478-B (IOU 0) and Optional AT481-B (IOU 1)

Test	CMD Buffer Name	Number of Passes (Decimal)	Test Complete (X)	Comments
QLT4		1	()	
EXT4		1	()	
PMT4		1	()	
PMU4		1	()	
CHD4	FII40	1	()	
CMA4		1	()	
MRA4		1	()	
MRT4		1	()	
ISI4	ISI4xx	1	()	
HYDR	HYDRzyy	1	()	
UHYD	UHYD	1	()	
CCA4	CCA4xx	1	()	
IPI4	IPI4xx	1	()	

Test AT511-A (IOU 0) and Optional AT512-A (IOU 1)

Run IOU diagnostic tests listed in table 4-2. Run the tests under normal conditions, no logic or clock margins.

If any problems occur during the tests, refer to the following IOU manuals:

- MSL 153/155 Maintenance Software Reference Manual Test Procedures
- MSL 153/155 Maintenance Software Reference Manual Test Descriptions

Table 4-2. IOU Tests for AT511-A (IOU 0) and Optional AT512-A (IOU 1)

Test	CMD Buffer Name	Number of Passes (Decimal)	Test Complete (X)	Comments
QLT44	FII44	1	()	
EXT44		1	()	
PMT44		1	()	
PMU44		1	()	
CHD44		1	()	
CMA44		1	()	
MRA44		1	()	
MRT44		1	()	
ISI44	ISI44xx	1	()	
HYDR4	HYDR4zy	1	()	
UHYD4	UHYD4	1	()	
CCA44	CCA44xx	1	()	
IPI44	IPI44xx	1	()	

Test Optional Standalone AT511-A (IOU 2) and AT512-A (IOU 3)

NOTE

These tests will be available in a later manual revision.

Run CP-0 Quicklook Tests

Run the CP-0 model-independent quicklook tests listed in table 4-3. Run the tests under normal conditions, no logic or clock margins.

If any problems occur during the tests, refer to the following CPU manual:

- CYBER 96X MSL Test Procedures Reference Manual

Table 4-3. CP-0 Quicklook Tests

Test ¹	CMD Buffer Name	Number of Passes (Decimal)	Test Complete (X)	Comments
TRAP3	1	1	()	
FCT93		1	()	
EXCH3		1	()	
EXC3 ²	INSTALL		()	
RCT13		25	()	
RCT23		200	()	
SNGL3		25	()	
CRPT3		25	()	
CMEM3		1	()	Section 11 only

Notes:

1. If quicklook tests are run individually, some manual inputs to screen prompts may be required and the system must be initialized if not previously done. For additional instructions, refer to the MSL 15X Maintenance Software Reference manual.
2. EXC3 runs at least 100 passes of CT8 and at least one pass each of CU8, MY1, and FS8.

Run CP-1 Quicklook Tests

Run the CP-1 model-independent quicklook tests listed in table 4-4. Run the tests under normal conditions, no logic or clock margins.

If any problems occur during the tests, refer to the following CPU manual:

- CYBER 96x MSL Test Procedures Reference Manual

Table 4-4. CP-1 Quicklook Tests

Test ¹	Number of Passes (Decimal)	INSTALL Test Complete (X)	INSTALB Test Complete (X)	Comments
TRAP3	1	()	()	
RCT13	25	()	()	
RCT23	200	()	()	
SNGL3	25	()	()	
CRPT3	25	()	()	
CMEM3	1	()	()	Section 11 only

Notes:

1. If quicklook tests are run individually, some manual inputs to screen prompts may be required and the system must be initialized if not previously done. For additional instructions, refer to the MSL 15X Maintenance Software Reference manual.
2. EXC3 runs at least 100 passes of CT8 and at least one pass each of CU8, MY1, and FS8.

Running Network Operating System Validation Suite

Refer to the NOS and NOS/VE System Validation Suite (SVS) User's manual to test CYBER 960 and 962 mainframe hardware features in a NOS or NOS/VE operating system environment. An Engineering Services field representative provides the site with the SVS User's manual and the SVS tape.

Checking Electromagnetic Compatibility

Use this check to determine reference points, using a voltage-level noise generator, for future reference.

NOTE

This check must be performed. It is not optional but may be performed at a time that is convenient to the site schedule to avoid causing noise problems to other systems in the computer room.

Refer to CAMS II MIF tape, and perform GRND procedures to test the electromagnetic compatibility (EMC) of the central computer.

Installing and Testing RTA Equipment

Use this procedure to install and verify the operation of the RTA equipment, except where RTA via data line is not allowed by the customer.

Should any problems arise during this installation and verification, call CYBER Hardware Support (CHS) for sites in the U.S.A. or your Technical Support office for international sites.

- ___ 1. Refer to Remote Technical Assistance Handbook to install RTA.
- ___ 2. Verify remote data-link operation within 48 hours after completion of computer system installation by:
 - ___ a. Notifying CHS 24 hours in advance of verification.
 - ___ b. Calling and establishing an RTA data link with CHS.

Glossary

A

div. 600
W. 100
subdiv. 100

Glossary

A

C

CCW

Counterclockwise.

Central Memory (CM)

The main memory of the CYBER 960/962 within the central processing unit cabinet. CM stores between 64 and 256 megabytes of data on 4 to 16 memory modules. CM hardware includes memory modules, a dedicated logic cage, a memory interface module, and voltage regulator modules.

Central Memory Control (CMC)

The logic element in the CPU that controls the movement of data between central memory (CMCA and CMCB) and the central processor. The CMC circuits reside on two logic modules located in the CP-0 logic cage, but accomplish memory control for both CP-0 and CP-1.

Central Processing Unit (CPU)

The main processing cabinet in the CYBER 960 Series mainframe, which includes the central processor (CP-0 and CP-1), central memory control, and central memory. The CPU cabinet has up to two central processors and between 64 and 256 megabytes of resident memory.

Central Processor (CP)

The functional processing logic within the CYBER 960/962 CPU. The first (or standard) central processor is referred to as CP-0. If a second central processor is provided with a system, it is referred to as CP-1. Each central processor resides in a separate logic cage and consists of eleven logic modules.

CHS

CYBER Hardware Support.

CIO

See Concurrent Input/Output.

CIP

CYBER Initialization Package.

CM

See Central Memory.

CMC

See Central Memory Control.

CMD

Command.

CMSE

Common maintenance software executive.

Computer room

A room that has a controlled environment that is maintained to meet the requirements of the system equipment.

Concurrent Input/Output (CIO)

An input/output unit architecture that functions with the NOS/VE operating system.

CP-0

See Central Processor. See also Central Processing Unit.

CP-1

See Central Processor. See also Central Processing Unit.

CPU

See Central Processing Unit.

CTI

Common test and initialization.

CW

Clockwise.

CYBER 960 Series (960/962) Computer Systems

Includes CYBER 960 and CYBER 962 computer systems. The CYBER 960 Series is Control Data's state-of-the-art middle- to high-range system, flanked by the 930 departmental computer on the low end and the 990 computer on the high end of the scalar performance spectrum. A full 960 system includes the mainframe (CPU, IOU, and power unit), MG set, system console, operating software, and a complement of peripherals.

D**DFT**

Dedicated fault tolerance.

Dual Processor

See Central Processor.

E**EI**

Environmental interface.

EMC

Electromagnetic compatibility.

Emergency Power Shutdown

A shutdown of part or all of system logic power occurs automatically upon expiration of a LW (1 minute for fault in IOUs; 2 minutes for fault in power unit, CPU cabinet, or for high ambient room temperature) or SW (2.5 seconds) if the fault still exists.

EMI

Electromagnetic interference. Synonymous with Radio Frequency Interference.

EXP

Expansion.

F**FCC**

Federal Communication Compliance.

FCO

Field change order.

Frequency converter

A motor generator mounted within its control cabinet.

H**Hdr**

Header.

Hertz (Hz)

A measure of frequency or band width the same as cycles per second.

Hz

See Hertz.

I**Immediate Emergency Power Shutdown**

An immediate shutdown of power without warning occurs automatically for faults that would damage equipment if they were to continue.

Input/Output Unit (IOU)

IOU contains the peripheral processors and channels that enable operator interaction with, and peripherals access to, the central processing unit. The IOU has either NOS and NOS/VE capability (CYBER 960) or is NOS/VE only (CYBER 962). The IOU has the interface port for the system console.

IOU

See Input/Output Unit.

IOU Expansion

An add-on IOU product that physically attaches to the CYBER 960 IOU. The IOU expansion is a concurrent input/output (CIO) architecture and allows for addition of up to ten peripheral processors and ten channels. The IOU expansion is the first IOU option to be added to a CYBER 960 mainframe, increasing the number of IOU cabinets to two.

IPI

Intelligent peripheral interface channel architecture in the IOU.

ISI

Intelligent standard interface channel architecture in the IOU.

L**LDS**

Literature Distribution Services.

LOC

Local.

Logic Cage

Hardware structure in mainframe central processing unit, input/output unit, or power unit that houses logic as memory modules or power boards.

Logic Module

A printed-circuit board with microcircuit chips.

Long Warning (LW)

The power unit generates an LW when an emergency power shutdown is to occur in approximately 1 minute if the fault is in an IOU or in approximately 2 minutes if the fault is in the power unit, CPU cabinet, or with ambient room temperature (assuming the detected fault continues).

M**Mainframe**

Includes the central processing unit, input/output unit, and power unit portions of the mainframe complex. The mainframe does not include the motor-generator set or the system console.

Mainframe Complex

The hardware products that make up a central processing computer system are referred to collectively as the mainframe complex. Includes the central processing unit, input/output unit, power unit, system console, and the motor-generator set. Peripherals are not included in the mainframe complex.

Motor-Generator (MG) Interface Unit

The electrical box that interfaces with the motor-generator set. Also see Motor-Generator (MG) Set.

Motor-Generator (MG) Set

A motor generator and a separate motor-generator control cabinet that converts 3-phase site utility power to 3-phase, 400-Hz power suitable for the mainframe electrical requirements. Smaller MG sets may include the MG and its MG control functions within one cabinet and be referred to as a frequency converter.

MSL

Maintenance software library.

Multiplexer (MUX)

Equipment that enables a site to concentrate data transmission between multiple slower-speed devices (such as, terminals and workstations) and a higher-speed channel. For example a multiplexer can concentrate data being transmitted between multiple terminals and an host computer by using a local area network.

MUX

See Multiplexer.

MUX BD

Multiplexer board.

N**Network Operating System (NOS)**

An operating system for the host computer. It has network capabilities for time-sharing and transmission processing in addition to local and remote batch processing. NOS controls the computation of programs submitted through remote terminals and maintains normal batch processing operations for jobs submitted locally.

Network Operating System/Virtual Environment (NOS/VE)

An operating system for the host computer. It has network capabilities for time-sharing and transmission processing in addition to local and remote batch processing. NOS/VE operates in Virtual State and controls the computation of programs submitted through remote terminals and maintains normal batch processing operations for jobs submitted locally.

NOS

See Network Operating System.

NOS/VE

See Network Operating System/Virtual Environment.

O**Optl**

Optional.

P**P/N**

Part number.

Peripheral equipment

Those devices in a system that are distinct from the mainframe and provide secondary storage or input/output functions.

Power unit

Provides power to support the electrical systems (logic, environmental, and so on) of the CPU. (The IOU has its own power supply.) The power unit occupies a cabinet that attaches to the CPU.

PP

Peripheral processor.

R**Radio Frequency Interference (RFI)**

Electrical noise signals that may cause health hazard and/or operational hazards to equipment.

RTA

Remote technical assistance.

RTA Modem

(ISO) A functional unit that modulates and demodulates signals. One of the functions of a modem is to enable digital data to be transmitted over analog transmission facilities. Modem is a contraction of modulator-demodulator.

S**Short Warning (SW)**

The power unit generates on SW when an emergency power shutdown is to occur in 2.5 seconds. Also see Emergency Power Shutdown.

SIB

See Side Interconnect Board.

Side Interconnect Board (SIB)

SIBs are the printed-circuit boards that interconnect the central processor logic modules. The multilayered SIBs actually constitute the sides of the CP logic cages. CP-0 logic modules are interconnected with SIB A and SIB B, while CP-1 logic modules are interconnected with SIB C and SIB D.

Single processor

See Central Processor.

Site

The computer room and other building locations that may include one or more motor-generator sets and data media storage.

SPCP

System power control panel.

Standalone IOU

The standalone IOU is an option that provides the CYBER 960/962 mainframe with a dual IOU configuration. The standalone IOU is installed on an island separate from the mainframe, but is linked to the CYBER 960/962 CPU with 50-ft cables. Up to ten peripheral processors (PPs) and ten channels reside in the standalone IOU cabinet.

Standalone IOU Expansion

A standalone IOU expansion product can be added to the standalone IOU, doubling the PP and channel capability of the standalone IOU configuration. The standalone IOU expansion and the IOU expansion differ only in their physical location relative to the mainframe.

SVS

System Validation Suite.

System Console

The keyboard and display screen used to monitor and control the operating system.

V**V**

1. Valid bit. 2. Also see Volt.

Volt (V)

A measure of the work needed to move an electric charge.

1**170 DMA**

CYBER 170 direct-memory access interface channel architecture in the IOU.

Please fold on dotted line;
seal edges with tape only.

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FOLD

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